metals review

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Metals Review

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THE NEWS DIGEST MAGAZINE

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IMPORTANT LECTURES

DEPARTMENTS

ASM REVIEW OF METAL LITERATURE

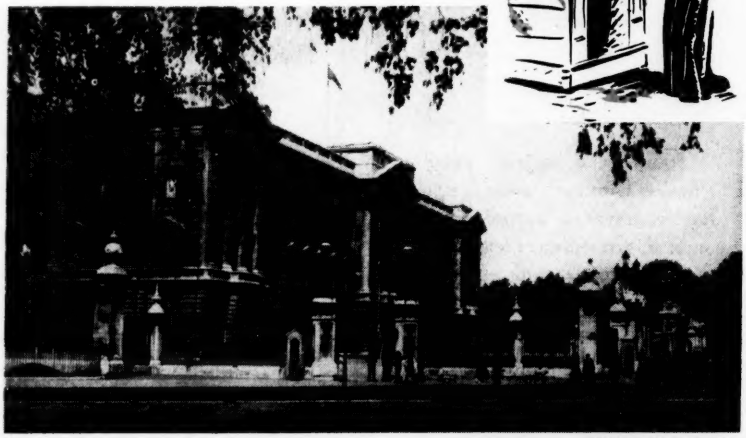
A. S. M. to Europe — England

A land of contrasts—of ancient castles and modern factories, stately cities and garden-like countryside, colorful pageantry and modern science—awaits A.S.M. members planning to visit Britain for the Metallurgical Congress in June 1955.

Due to the compact nature of the country, numerous attractions can be seen in a limited time. Even though A.S.M. members will be busy attending meetings and visiting factories and laboratories, they will still be able to see a great many of Britain's interesting sights.

Consider what can be seen in London on a two-hour walk. From Piccadilly Circus to Trafalgar Square, where Nelson's Column and the National Gallery are located, takes only a few minutes. To get a feeling of the city's history and tradition, you can turn down Whitehall and see the Houses of Parliament, Westminster Abbey, No. 10 Downing St. and Scotland Yard. In the heart of Gothic Westminster Abbey are the Stone of Scone, resting under the Coronation Chair, in legend the stone pillow on which Jacob rested, and the burial places of the kings, queens, poets and great men of England.

Across the street is Big Ben, 100-year old timepiece whose resonant boom has become a familiar sound to radio listeners all over the world, on the tower of the Houses of Parliament, the largest and grandest buildings in London.



Buckingham Palace

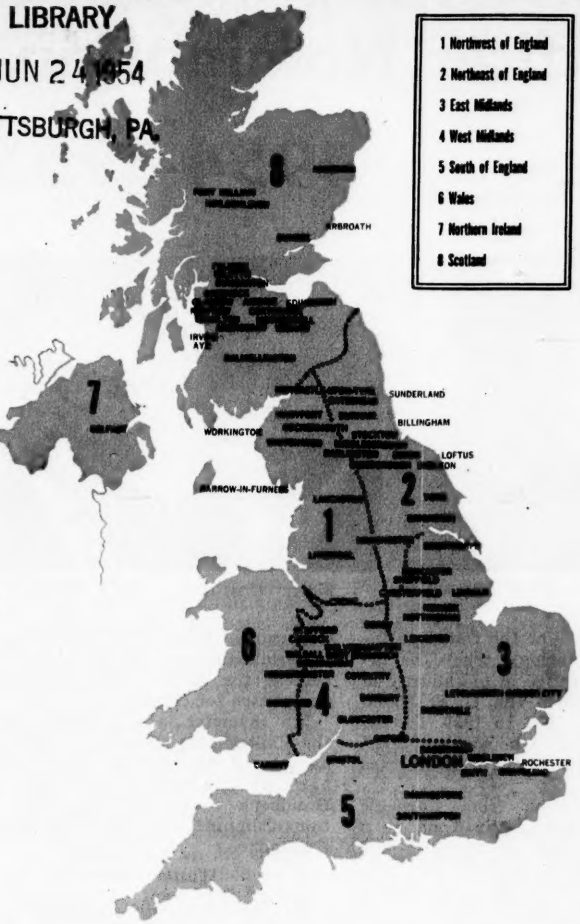
A 10-min. walk up The Mall will take you to Buckingham Palace, Queen Elizabeth's residence. On alternate days, when the Queen is in residence, the ceremony of Changing the Guard, with soldiers parading in tall bearskin helmets, accompanied by a military band, can be seen. Another ceremony concerning the Queen's Life Guards takes place at the Horse Guards off Whitehall every day.

Piccadilly Circus, the Times Square of London, with its statue of Eros and its famous flower venders, and Trafalgar Square, are two main centers the tourist will want to see. The National Gallery is located in the Square as well as St. Martin's-in-the-Fields, one of London's loveliest churches.

Thirteen all-day excursions are planned for A.S.M. visitors to England. Each tour offers a chance for a glimpse into the history and pageantry of British life—four of them include visits to famous castles, two will take in the famous British gardens, two are to major university towns, one tour runs along the Thames where the picturesque, busy English waterway can best be seen, and six involve visits to laboratories of special interest to metallurgists. Choosing a tour from each category would give a visitor, despite limited time, a well-rounded look at Britain. Five provincial tours are scheduled, each combining a work visit with a trip to one of Britain's well-known centers — Stratford-on-Avon, Edinburgh and Glasgow, the Peak district, Birmingham and Cambridge.

Windsor, less than an hour from London and one of the one-day excursion points, is a town of great beauty, antiquity and historical interest. The castle at Windsor was the home of English kings for more than 850 years and gave the present line of the royal family its name. Across

Westminster Abbey



Industrial England

The map at the left indicates at a glance the areas in Great Britain where the greatest concentration of metalworking and allied industries may be found. Since all parts of the British Isles are connected by a splendid network of road, rail and air communications, the visitor to the European Metallurgical Congress should experience no difficulty in reaching the particular area in which he is most interested, even though limitations on time and energy might lead him to believe that a visit to this or that industrial plant or scientific laboratory would be "nice but impossible".

The principle metalworking and allied industries of Great Britain include numerous iron and steel works, shipbuilding yards and the industries related to marine engineering, ordnance works, aircraft-producing factories, wire drawing, aluminum production and numerous kinds of heavy engineering equipment.

the river from the castle are the playing fields of Eton, the school founded by Henry VI in the 15th Century. This excursion will include a visit to the Fulmer Research Institute, located at Stoke Poges, the site of William Penn's ancestral home.

Only ten miles from the center of London stands Hampton Court where Henry VIII lived with his third and fifth wives, whose ghosts are said to haunt the place, and Ann Boleyn, who was beheaded before the suite of rooms being built for her could be completed.

Britain's two oldest universities, Oxford and Cambridge, which date back to the 12th Century, are only a day's excursion from London. These medieval towns are not only fascinating because of their history and their striking architecture, but also for their scenic beauty. The route to Oxford goes through a part of the Cotswolds, the charming area of stone cottages and rolling grassy slopes where sheep have grazed for centuries. At Cambridge, the "Backs" or river side and fields behind the college, is one of Britain's loveliest spots.

At Oxford, visitors can see the first printed Bible, Virgil and Plato manuscripts from the 1st Century and other symbols of its rich scholastic heritage. In the peaceful, pretty town of Cambridge, visitors follow in the footsteps of Wordsworth, Samuel Butler, Coleridge, Pepys, Milton and a host of illustrious scholars.

The lowlands of Scotland, with its lovely lochs, wooded glens and romantic castles, can be seen on a four-day tour to Edinburgh and Glasgow, the longest of the provincial tours planned for A.S.M. members. Leaving London on a Friday night, the visitor will wake up in Edinburgh on Saturday morning to spend the next two days in and around the medieval Scottish capital and the following two days in Glasgow.

Known as the "Athens of the North", Edinburgh is divided down its full length as if by a sword. On one side of Princes Street, the main thoroughfare, are shops and cafes, on the other are gardens and the hill leading to the fortress-like castle. Going from the castle down the Royal Mile, in the most picturesque and ancient section of the city, one comes to the Palace, where the royal family stays when they are in Scotland.

A short distance from the center of the city is the Firth of Forth, the finger-like stretch of water spanned by the massive Forth Bridge, considered one of the engineering wonders of the world. The scenery around the city includes rugged mountains, rocky cliffs and some of the best farm land in the world.

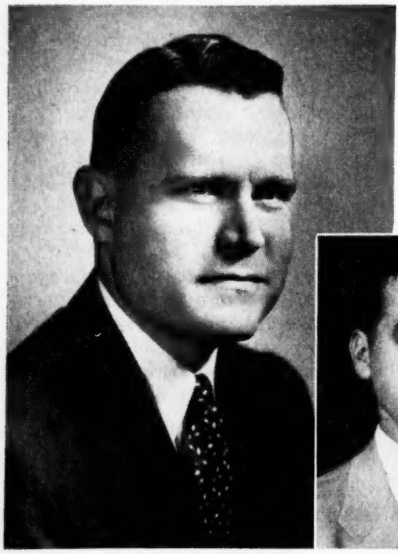
Between Edinburgh and Glasgow are the Trossachs, a chain of lochs in a beautiful wooded valley and lovely Loch Lomond. In Glasgow, the largest city in Scotland and a great industrial center, A.S.M. members will make several plant visits. The shipyards where the Queen Elizabeth and Queen Mary were built, a 13th Century cathedral, and the university of Glasgow make interesting visits. The city is also a center for trips to the Burns country and the western part of the Highlands and Lowlands.

Shakespeare's Stratford-on-Avon is the locale of another provincial tour which also takes the visitor to South Wales, home of the coal industry and magnificent mountain scenery. Stratford-on-Avon contains not only the timbered house where Shakespeare was born, but the school he attended, his mother's home, a museum, Ann Hathaway's cottage, his grave and the Memorial Theater where performances of his plays are presented.

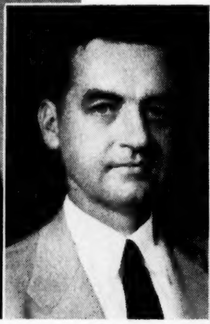
The same tour will take A.S.M. members to Cardiff, center of the Welsh coal mining area. Visits will be made to iron and steel and nonferrous plants, and during the trip visitors will have a chance to see the 11th Century Cardiff castle and the famous race course. The wild mountain scenery, the countless rivers, the ancient ruins scattered through the country will make this "work tour", like the entire trip to Britain, an exciting sightseeing trip as well.

This article was written for Metals Review *by the British Travel Association and is based on the itinerary of the European Metallurgical Congress for 1955. Places mentioned are restricted to areas easily accessible for those attending the Congress.*

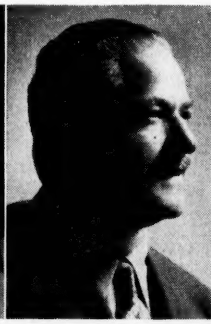
Officer Nominations 1954-1955



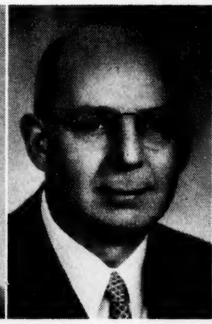
G. A. Roberts



A. O. Schaefer



W. H. Eisenman



Walter Crafts

K. L. Fetters

Nominations for new national officers of the American Society for Metals have been announced by the Nominating Committee, which met in Chicago on May 20, under the chairmanship of Maurice J. Day, assistant director of the Armour Research Foundation of the Illinois Institute of Technology.

George A. Roberts, currently serving as vice-president, was nominated for president, and Adolph O. Schaefer, who will complete a two-year term as national trustee this fall, was selected as the nominee for vice-president.

The committee of past presidents who nominate a secretary met in New York on May 27 and nominated W. H. Eisenman for the 19th time. This committee consisted of A.S.M. President James Austin, chairman, and the six men who most recently held office of A.S.M. president.

Two additions proposed for the Board of Trustees are Walter Crafts, associate director of research, Electro Metallurgical Division, Union Carbide and Carbon Research Laboratories, Niagara Falls, N. Y., and Karl L. Fetters, assistant to the vice-president in charge of operations, Youngstown Sheet & Tube Co., Youngstown, Ohio.

In accordance with the Constitution of the American Society for Metals, additional nominations for any of these posts except secretary may be made by written communications addressed to the secretary of the Society and signed by any 50 members. If no such additional nominations are received prior to July 15, nominations shall be closed and at the annual meeting in November 1954 the secretary will cast the unanimous vote of the members for these candidates.

George A. Roberts

Dr. Roberts, nominee for president, is vice-president of technology, Vanadium-Alloys Steel Co., Latrobe, Pa. He is a graduate of the Carnegie Institute of Technology, where he received a B.S. degree in metallurgy in 1939. He attended the U. S. Naval Academy from 1937 to 1939. During the summer of 1938 he was employed by the Bell Telephone Laboratories in New York.

After graduating from Carnegie Tech., Dr. Roberts stayed on as a teaching assistant in physical and ferrous metallurgy and in 1941 was granted a M.S. degree. He joined the Vanadium-Alloys Steel Co. in 1940, returning to Carnegie Tech the same year under a Vanadium-Alloys graduate fellowship, and was granted a Ph.D. in 1942. He was appointed research metallurgist in 1942 and today is the company's vice-president of technology.

Mr. Roberts is co-author of the book, Toolsteels, published by American Society for Metals in 1946.

A. O. Schaefer

Adolph O. Schaefer, nominee for vice-president, was elected trustee of A.S.M. in 1952 after many years of active participation in the Society's affairs and services to the metal-working industry.

He is a graduate of the University of Pennsylvania, having received a B.S. degree in chemical engineering in 1922. He has spent his entire business career with the Midvale Co., Nicetown, Pa., first as a metallurgist from 1922 to 1924, and as assistant engineer of tests for the next 13 years, after which he was made assistant production manager. In 1942 he was promoted to executive metallurgical engineer and in 1945 to executive engineer. In 1950 he was made assistant to the executive vice-president, and a year later vice-president in charge of engineering, his present position.

From 1939 through 1945, Mr. Schaefer was associated with many vital activities concerned with the Government's production of ordnance materials and he is presently a member of the Government's Advisory Committee for Guns.

Mr. Schaefer is past chairman of the Philadelphia Chapter A.S.M. and has served on many of A.S.M.'s national committees, including the Handbook Committee, the Publications Committee and the Nominating Committee.

Walter Crafts

Mr. Crafts, nominee for trustee, received his A.B. degree from Yale University in 1924, and his M.S. degree from Massachusetts Institute of Technology in 1926. From 1926 to 1929 he was employed in the metallurgical department, South Works, Illinois Steel Co. Since that time he has been associated with the Union Carbide and Carbon Research Laboratories and presently holds the position of associate director of metallurgical research at the Electro Metallurgical Division in Niagara Falls.

During his career as metallurgical engineer, Mr. Crafts has published several papers on deoxidation and the effects of alloys in steels.

He has been a member of A.S.M. since 1926, and was chairman of the Buffalo Chapter from 1942 to 1943. He was a member of the A.S.M.'s Publications Committee from 1942 to 1944 and became chairman of that committee in 1947.

Karl L. Fetters

Karl L. Fetters, the second nominee for trustee, received his degree in metallurgical engineering in 1931 from Carnegie Institute of Technology and his Ph.D. in 1940 from Massachusetts Institute of Technology. He has been on the teaching faculty of Carnegie Tech and previously held a research assistantship at M.I.T. He was a metallurgical engineer for the operating vice-president of Youngs-

(*Continued on p. 7*).

Speak on Powders, Cermets and Ceramics

A Panel of Three Experts Discussed "Metal Powders, Cermets and Ceramic Coatings" at a Meeting in New Jersey. Panel Members Henry H. Hausner, Jerome F. Kuzmick and John Wambold are shown with Chapter Chairman W. Hughes White (Second From Right) at the Dinner Preceding the Meeting

Speakers: J. F. Kuzmick H. H. Hausner and J. Wambold

A panel of three experts discussed the characteristics of "Metal Powders, Cermets and Ceramic Coatings" which make them suitable for elevated temperature service, at a meeting in New Jersey. The panel consisted of Jerome F. Kuzmick, president of the Welded Carbide Tool Co., Henry H. Hausner, manager of the Atomic Energy Division of Sylvania Electric Products, Inc., and John Wambold, ceramic engineer, Curtiss-Wright Corp. Discussion moderator was John L. Everhart, associate editor, ***Materials & Methods.***

Each of the panel members presented a 20-min. talk on his subject. The meeting was then opened to discussion from the floor with the experts answering questions on their specialties.

Mr. Kuzmick's subject was "Metal Powders". He gave a general description of powders used for the production of cermets and high-temperature alloys and illustrated his remarks with slides showing various powders. He discussed the methods of making metal powder alloys, including the mixing of the elemental powders, the incorporation of master alloys made by the hydride process and the production of stainless steel powder by disintegrating scrap or atomizing the molten metal. He also mentioned the advantages of hot pressing in producing high-density compacts at low pressures.

Dr. Hausner discussed "Cermets". Since it offers an introduction to the general field, the speaker mentioned first the aluminum-alumina cermet known as SAP. This material, which is processed by the usual metal powder techniques, contains up to 16% aluminum oxide and is characterized by excellent strength at elevated temperatures. He continued with a discussion of various cermets which are combinations of metal powders with ceramic materials such as oxides, borides, carbides and nitrides, illustrating their properties with tables and graphs. The speaker pointed out that combinations of these materials are used in gas turbines, jet engines, for cutting tools and for electrical semiconductive applications.

Mr. Wambold discussed "Ceramic Coatings". He pointed out that these differ from pure porcelain enamels since the ceramic coatings are partially crystalline materials while the enamels are glass. The speaker discussed the compositions of some coatings used for the protection of mild steels and stainless steels and mentioned the methods used in applying the coatings. The application of coatings to prevent carburizing and nitriding of specific areas was illustrated with slides.

During the discussion period which followed, most interest centered in the properties of cermets. It was brought out that none of the cermets were as ductile as the metals with which the metallurgist is accustomed to work but they can be used advantageously if proper designs are used to compensate for this relatively low ductility. It was pointed out that cermets will have to be used if temperatures much above 2000° F. are to be employed.

In reply to a question on SAP, a slide was shown giving the properties of compacts produced from powders having different oxide contents.

The use of coatings for heat treating racks was discussed and the improvement in life of protected over unprotected racks mentioned.—**Reported by John L. Everhart for the New Jersey Chapter.**

(*Continued from p. 6*)

town Sheet & Tube from 1943 to 1950 when he was appointed assistant to the vice-president in charge of operations.

Dr. Fetters has been active in committee work of A.S.M. and was chairman of the Educational Committee in 1949. When the Mahoning Valley Chapter established the Marcus A. Grossmann Memorial Lecture, Dr. Fetters was honored by being chosen as the first lecturer.

Dr. Fetters has had several papers on openhearth metallurgy published in technical publications and is the co-author of a chapter of the book, Basic Openhearth Steelmaking.

W. H. Eisenman

W. H. Eisenman, who was nominated for secretary for the 19th time, is a founder-member of the Society, and has been its national secretary for 36 years. In that time the Society has grown from a nucleus of 200 members to an organization of 89 chapters and more than 23,600 members.

Develops Studies on Mechanism of Fatigue At Penn State Meeting

Speaker: L. F. Coffin, Jr.

Knolls Atomic Power Laboratory

One of the most insidious phenomena encountered in the engineering world was discussed by Louis F. Coffin, Jr., General Physics Unit of Knolls Atomic Power Laboratory, at a meeting of the Penn State Chapter in a talk on "The Mechanism of Fatigue".

Following a very fundamental explanation of fatigue, Dr. Coffin gave the historical development in the study of this type of failure. He told of the first engineering problem that brought attention to this subject—failure of railroad axles. From this beginning he led up to his phase in the research on this problem.

Dr. Coffin described his study of the effects of cyclic thermal stresses on a ductile metal. In his work he set a two-fold objective: To investigate the resistance of a given material to thermal stress-fatigue damage under specified conditions; and to conduct some fundamental research on fatigue itself.

Various factors such as hysteresis, the Bauschinger effect, strain-hardening, strain-aging and fatigue-crack formation were discussed. Dr. Coffin showed that strain-hardening is not an important consideration in the problem of fatigue. In conclusion, he offered a mechanism to relate these factors.—**Reported by W. Barry Collins for Penn State.**

Metallurgist Retires

Samuel H. Graf, director of the engineering experiment station at Oregon State College, retired in April after 46 years of service at O.S.C. He holds the rank of professor emeritus of mechanical engineering, and plans to continue private consulting work in materials, metallurgical and mechanical engineering. He has four inventions to his credit; a universal strainometer for materials testing, an orifice meter chart evaluator, a slip meter for belt testing machines, and a salt-velocity method for measuring water. Prof. Graf was editor-in-chief of the Gas Engineers' Handbook, published in 1934 by McGraw-Hill, and now in its seventh printing.

Over 1200 members have had continuous membership for 25 years or more.

Talks on Creep of Metals at Oak Ridge

Glenn J. Guarnieri (Right) Cornell Aeronautical Laboratory, Who Presented a Talk Entitled "Creep of Metals" at a Recent Meeting of the Oak Ridge Chapter, Is Shown With D. A. Douglas of the Oak Ridge National Laboratory

Speaker: Glenn Guarnieri
Cornell Aeronautical Laboratory

Glenn Guarnieri of the Cornell Aeronautical Laboratory spoke before the Oak Ridge Chapter on the timely subject of "Creep of Metals", with special reference to the unusual effects resulting from temperature fluctuations and load variations. These practical aspects of creep testing and behavior logically followed the Chapter's recently completed educational series when the "Fundamentals of Creep" were clearly described by N. J. Grant of Massachusetts Institute of Technology.

Pulsating loads and temperature fluctuations are common in many practical high-temperature applications such as gas-turbine components, guided missiles, jet engines, etc., but the bulk of available creep data are concerned with constant load and constant temperature tests.

Mr. Guarnieri described some tests for several commercial heat resistant alloys, as well as Armco iron, to indicate the sensitivity of creep rate to the frequency of fluctuating loads at elevated temperatures. Significant acceleration of creep occurs if fluctuating loads are superimposed upon mean static loads at a low frequency. As frequency increases, creep rate decreases so that cyclic loads, with amplitudes as great as 50% of the mean load, may be applied at sufficiently high frequencies without increasing the creep rate produced by the static load condition. As temperature increases, higher frequencies are needed to prevent accelerated creep. This does not mean that rupture may be correspondingly unaffected, since fatigue damage may cause reduced ductility leading to premature failure.

Cyclic temperature tests present experimental problems as well as uncertainties in interpretation. Nevertheless, Mr. Guarnieri illustrated several significant trends. When 347 stainless steel was tested at constant temperature, the usual first and second stages of creep were encountered; however, the application of a pulsating temperature rise (during which time the specimen was unloaded) resulted in an abnormally high creep rate, characteristic of the first stage. This was interpreted as annealing out the strain-hardening effects which are ordinarily partially active in the first and second stages of conventional creep tests. It was also suggested that premature failure, encountered under cyclic temperature conditions, might be partly attributable to superimposed thermal-fatigue stresses where conditions were such as to generate intergranular oxidation or similar notch effects.

It was indicated that current studies of this type are being conducted with the objective of providing qualitative guidance information which can be used in conjunction with available static load and temperature creep data for design purposes. — **Reported by Anton deS. Brasunas for Oak Ridge.**

Driver-Harris Conference

The Driver-Harris Co., Harrison, N. J., world's largest manufacturer of nickel-chromium alloys, convened its 5th International Business Conference of Associates and Distributors in Manchester, England, recently, with the announcement of the opening of manufacturing facilities in Madrid, Spain. Plans were also announced for the immediate reconstruction of its Mantes, France, plant. The conference was attended by Frank L. Driver, Jr., president, S. M. Tracy, executive vice-president, and 40 technical and commercial general managers, engineers and agents.

is the largest group of metal engineers in the world.

Receive 25-Year Member Certificates

At a Meeting of the Canton-Massillon Chapter Held Recently, 25-Year Membership Certificates Were Presented to E. S. Rowland (Right), Chief Metallurgical Engineer, Steel and Tube Division, Timken Roller Bearing Co., and H. A. Tobey (Center), General Superintendent of the Canton and Gambrinus Bearing Plants, Timken Roller Bearing Co. The presentations were made by O. J. Horger, chief engineer, Railway Division, Timken Roller Bearing Co. (Reported by G. P. Michalos for the Canton-Massillon Chapter)

Describes Scorpion Jet Fighter Plane At Northern Ontario

Speaker: Victor Milner, Jr.

U. S. Air Force

Members of the Northern Ontario Chapter heard Lt. Col. Victor Milner, Jr., commander of the 534th Air Defense Group at Kinross Air Force Base, Kinross, Mich., present an informal talk on the F-89 Scorpion jet fighter plane at a recent meeting. Col. Milner called the Scorpion the world's best all-weather fighter-interceptor.

Beginning with the development of the plane, Col. Milner described its early shortcomings and the difficulties that had to be overcome in order to produce its present high performance characteristics. Stresses, proper metal grain structure and problems in metal expansion all had to be beaten before the Scorpion was made into the capable performer it now is. A plane of this type must be built to withstand heavy stresses at low altitude, even though, at higher altitudes where air is thinner, these stresses are not so great. He emphasized that for every pound put in the cockpit, 9 lb. of structure are required in building materials.

V. Milner, Jr.

Today's fighters weigh nearly 50,000 lb., whereas the average World War II fighter weighed 14,000 lb. The Scorpion has more instruments for the pilot to read than the large commercial air transports, costs close to $1,000,000 to build and carries over 2000 gallons of fuel.

Fuel consumption at standard power setting is directly proportional to the altitude at which you are flying, Col. Milner pointed out. The higher the plane is, the less fuel is required. A pilot can, therefore, use his entire fuel load in 30 min. or extend his endurance for over 3 hr., depending on how high he is flying. Starting and take-off speed is important in an all-weather interceptor squadron and the Scorpion can get air borne in 3 min., which is many times faster than a normal T.C.A. take-off. A device called the "afterburner", which sprays extra fuel into the engine exhaust, gives the jet an increase in thrust and performance for intercepts.

One of the highlights of Col. Milner's talk was his dissertation on a conventional flight from Chicago to Kinross Airport, accomplished in something like 38 min. He introduced a number of humorous anecdotes in describing radar, navigation instruments, gas and pressure gages, and made an interesting comparison of the straight-wing versus swept-back wing type of fighter.

After Col. Milner's talk, 2nd Lt. John C. Browning entertained the Chapter with a complete briefing of the normal aircrew flight equipment. Included in the display was the anti-exposure suit which prevents a pilot from being frozen or paralyzed if he is unfortunate enough to come down in Lake Superior in the middle of winter. This suit will sustain life for 70 hr. in the coldest water. Life vests, crash helmets and oxygen supply units were shown and their uses demonstrated. Of particular interest, from a safety and rescue standpoint, was the two-way radio, which can send signals 100 miles. Lt. Browning stated that jet fighters fly in atmospheres where there is little oxygen, and if a pilot were to bail out of his plane he would soon lose consciousness. Today's parachute is equipped with a device which delays the chute opening until the pilot has reached an altitude where sufficient oxygen is present to sustain life. In other words, the pilot may "free fall" for thousands of feet, lose consciousness, and his chute will open automatically. Apart from the above-mentioned equipment, the pilot carries a miscellaneous assortment of safety devices such as flares, compasses, and even fishing tackle complete with instructions on "how to use"—a device useful in many contingencies.

A question and answer period closed this most informative and enlightening meeting.—**Reported by J. B. McNichol for Northern Ontario.**

Importance of Quality Control Demonstrated At Notre Dame Meeting

Speaker: Joseph Gyoles

Bendix Products Division

At a recent meeting of the Notre Dame Chapter, Joseph Gyoles, quality control engineer, Bendix Products Div., talked on "Quality Control."

According to Mr. Gyoles, quality must be built into a product—it cannot be inspected into it.

Statistical quality control is principally confined to single operations in inspection, or on a machine making a part. In other words, to get the quality level of an assembly, quality ratings must be made of each one of the component parts.

One of the most valuable aspects of the quality control system is the psychological effect it has on the operator of a machine fabricating a part. Before him at all times is a current record of the parts he is producing. From that he can determine tool life or any other factor that may be instrumental in causing the parts to be produced out of quality control limits.

Quality control will likewise tell you if you are holding a part to limits that are too close for the intended application. In this case, the parts will be costing too much to produce and cost reductions can be made.

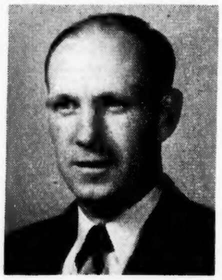
To give us first-hand information on how the speaker uses this tool, the complete layout was given on the control of the cyanide case hardening process as used at Bendix.

Two films were shown giving the mechanics of how statistical quality control works and how it is applied to the job.—**Reported by R. C. Pocock for Notre Dame.**

At Wichita Course on Fundamentals of Metallurgy

Shown During One of the Educational Lectures on the "Fundamentals of Metallurgy" Presented by the Wichita Chapter Is a Part of the Large Audience Attending. (Reported by R. E. Layton for the Wichita Chapter)

Meet Your Chapter Chairman



A. A. Moore

O. H. Davenport

H. J. Elmendorf

SAGINAW VALLEY

ALBERT A. MOORE was born in Midland, Mich. He received an A.B. degree in science and mathematics from the Central Michigan College of Education, taught school for seven years and went to college at the same time, finishing the last three years of college while teaching. From teaching he went into a laboratory job as an assistant at the Dow Chemical Co., working on plant metallurgical problems. He is presently the secretary of the Standards Committee, magnesium department, Dow Chemical Co., working on specifications and standards for magnesium alloys.

Al is married and has four children. He is a member of A.S.T.M., and has served in various offices and committees for A.S.T.M., and in several offices of his Chapter A.S.M. He is chairman of the Magnesium Subcommittee of Nonferrous Metals Committee for S.A.E.

He likes to hunt, fish and play volley ball, and is an interested spectator of all sports. His spare time at home is spent in construction work and in his garden, and he is also active in a reforestation project, having planted about 15,000 trees on his farm.

WORCESTER

HAROLD J. ELMENDORF was born in Cooperstown, N. Y., and attended Albany High School, Albany, N. Y., and Rensselaer Polytechnic Institute. He participated in basketball and tennis while at college.

His first job out of school was as a metallurgical investigator in the U. S. Steel Corp.'s Research Laboratories. His present position is chief spring engineer, American Steel & Wire Co., a division of U. S. Steel.

Mr. Elmendorf is married and has one son. He is a member of the Worcester Chapter's executive committee and has served as program chairman. His hobbies are photography, golf and tennis. He is also manager of a Little League Baseball team in Worcester.

ROME

FRANCIS C. ALBERS was born in Mobile, Ala. Before going to college he shipped out from New Orleans as a seaman on an ocean freighter, spending nearly a year at sea and making one trip around the world and several to the West Coast and the Hawaiian Islands.

He graduated from the University of Wisconsin in 1940 with a B.S. degree in metallurgical engineering. In college he was chairman of the first Wisconsin Engineering Exposition and chairman of the student chapter A.I.M.E. After graduating he worked for the Steel and Tube Division of Timken Roller Bearing Co., spending one year as a student trainee and one year in the metallurgical laboratory. In 1942 he went into the Navy and was assigned to the Naval Proving Grounds in Dahlgren, Va., where he worked for four years on the develment of heavy armor plate and armor-piercing projectiles. He attained the rank of Lieutenant Commander.

In 1946, Mr. Albers accepted a position in the research department at Caterpillar Tractor Co. as a staff metallurgist, and in 1949 he joined the Chicago Pneumatic Tool Co. He became chief metallurgist when the company moved its Detroit and Cleveland plants to Utica, N. Y., in 1950. In his present position he is also in charge of metallurgical activities in Chicago Pneumatic plants in Franklin, Pa., and Ft. Worth, Texas.

Mr. Albers, who is married and has two children, is a member of A.I.M.E. and the Industrial Club of Utica. He devotes his free time to his family and to his hobbies of woodworking, photography and sailing.

TOLEDO

ERNEST C. KRON is a native of Cyrus, Minn. He graduated from the University of Minnesota in 1930 with a degree in metallurgical engineering, and worked in the metallurgical laboratory at Bethlehem Steel Co. after leaving college. He subsequently held jobs in metallurgical research and in steel mill metallurgy before coming to his present job as a steel metallurgist for the Doehler Jarvis Division of National Lead Co.

Ernest is married and has one daughter. He is a member of fraternities and A.S.T.M., and has held all offices in the Toledo Chapter.

Fishing, photography and gardening are Mr. Kron's hobbies.

TEXAS

W. MACK CROOK was born and received his elementary education in Beaumont, Texas. He graduated from the University of Texas with a B.S. degree in metallurgical engineering in 1931 and an M.S. degree in 1932. He participated in basketball and track at junior college. His first job was at Pitcairn Aircraft Co. Mack is presently a consulting engineer.

He is married and he and his wife Margie have three children, Bill, 10, Jimmy, 6, and Martha Jean, 1. He is a member of civic and social clubs, the Chamber of Commerce and active in Boy Scout work. He has held several offices in his Chapter and is on the Constitution and By-Laws Committee A.S.M.

Photography, stamps and rocks are Mack's hobbies and he is also active in the Civilian Defense Corps and the State Guards.

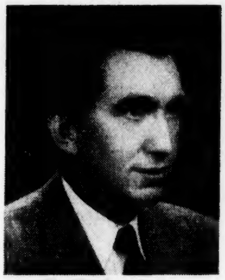
F. C. Albers

J. F. Jones

E. C. Kron

W. M. Crook

O. Zmeskal



R. E. Layton

J. Havlicek

M. D. Coughenour

WICHITA

R. E. LAYTON was born in Baltimore, Md., in 1908, and attended Baltimore City College, graduating in 1926, and Johns Hopkins University for three years. His first job was at the Baltimore Copper Smelting and Rolling Co. as a metallurgist. This was followed six years later by a job as metallurgist at the Rustless Iron and Steel Corp., now Armco-Rustless Division. During World War II he was chief inspector for the Baltimore Regional Office of the Philadelphia Ordnance District, and he spent four years as quality control manager in can manufacturing. In 1949 he became associated with the O. A. Sutton, Corp., in Wichita, as quality control manager.

Mr. Layton was married in 1929 to Alyce Schulte and they have two sons, Bill, a junior in high school, and Bob, Jr., a junior at Kansas State College. He is a senior member of the American Society for Quality Control, and a member of the Rocky Mountain Federation of Minerologic-al Societies. In 1953 he was appointed to the A.S.M. National Constitution and By-Laws Committee.

Strangely enough for a Kansan, his principal hobby is salt water fishing. Other hobbies more often followed are mineral collecting and cooking.

CEDAR RAPIDS

JOHN HAVLICEK was born in Cedar Rapids in 1916. After graduating from Grant High School he took a job with the Iowa Steel and Iron Co. as a steel worker and welder. This was followed by 12 years in heavy road machinery with LaPlant Choate (now Allis Chalmers). John served several years as a welder, was promoted to time study and methods, and later was appointed supervisor.

In 1949 he transferred to Link-Belt Speeder Corp. as supervisor in time study and methods. For the past year he has served as assistant metallurgist. He has studied correspondence courses and attended night schools for several years.

John has five children, four boys and a girl, and finds time for such hobbies as hunting, fishing, gardening and metalcraft. He has also been active as assistant scoutmaster of Boy Scout Troop 32.

CHICAGO

OTTO ZMESKAL was born in Chicago and attended elementary and high schools there. He received a B.S. degree in chemical engineering from Armour Institute of Technology in 1936, an M.S. degree in 1938, and a Sc.D. degree in physical metallurgy from M.I.T. in 1941. His first job was as a practice apprentice at the South Works of Carnegie-Illinois Steel Corp., and subsequent jobs were as an instructor of metallurgy and chemistry at Armour Tech and at M.I.T., and as director of research at Universal-Cyclops. He is now professor and director of the department of metallurgical engineering at Illinois Institute of Technology.

Otto and his wife Florence have three children, Ellen, 9, Kathi, 7 and Ann, 4. He is a member of A.I.M.E., Iron and Steel Institute (London), Institute of Metals (London), Western Society of Engineers, A.S.E.E., A.C.S., Faculty Council at Illinois Tech, and of honorary fraternities.

Otto has served on the A.S.M. educational committee, was an escort during the World Metallurgical Congress and is faculty sponsor of the Illinois Tech Chapter A.S.M. He is a recipient of one of the A.S.M.'s Teaching Awards.

Otto enjoys hiking in his spare time.

UTAH

ORSON H. DAVENPORT was born in San Francisco, and educated at Lowell High School and Humboldt Evening High School, San Francisco. He took agricultural courses at the University of California and participated in football while at school.

His first job was as plant cashier for the Western Union Telegraph Co., and he has sold safety appliances and industrial equipment. His present position is district manager for Linde Air Products Co.

Mr. Davenport is married and has no children. He belongs to the Masonic Order, A.W.S., Utah Association of Sales Executives, Utah Manufacturers Association, and is chairman of the industrial committee of the Chamber of Commerce.

Mr. Davenport enjoys a good game of golf. He is a World War I veteran, having served as a Second Lieutenant, 14th Field Artillery Brigade, Camp Custer, Mich.

ROCKY MOUNTAIN

Pueblo Group

JOHN F. JONES received his B.S. degree in metallurgical engineering from the South Dakota School of Mines in 1933. As a student he was a member of Sigma Tau and Triangle and honorary fraternities in engineering. His first job was as rodman and inspector for the South Dakota Highway Department. He next worked as an assayer for the Bald Mountain Mining Co., after which he moved to Colorado and became mill foreman, Cyanide Division, Cripple Creek Milling Co.

In March 1937 he joined Colorado Fuel and Iron Corp. in the metallurgical department of the Pueblo plant. At the outbreak of the war in 1941 he was appointed foreman in the shell forging plant, and after the war was transferred to the industrial engineering department for a year, then was appointed assistant superintendent of the bolt, spike, grinding ball and grader blade division. Three years later, in 1949, he was elevated to superintendent of this division, the position he now holds.

Mr. Jones and his wife Ruby have two daughters, age 8 and 10, who are responsible for Mrs. Jones' activities in Brownie and Girl Scout work. John is an enthusiastic supporter of high-school and professional sports, but admits he misses the pheasant hunting which was his favorite sport while growing up in his home state of South Dakota.

SYRACUSE

MELVIN D. COUGHENOUR was born in Pittsburgh. He received his degree in metallurgy from the Pennsylvania State College in 1938. While in college he was interested in football, track and other sports. He worked as a looper at Bethlehem Steel Co. when a student and worked as a metallurgist for the General Drop Forge Co., Buffalo, after college. He is presently a sales engineer for the Carpenter Steel Co.

Mr. Coughenour is married and has two boys and two girls. He is a member of several civic and social organizations, and is a golf and fishing fan.

TO A.S.M. Members: Many of you are looking forward with pleasure to more details about the Technical Societies Congress in Europe from June 1-19, 1955. If you wish to be immediately informed on additional plans as they develop for the technical program and the planned visits, then send your name to A.S.M. headquarters and request to be placed on the mailing list to receive information about "A.S.M. to Europe in '55".

Receives McFarland Award at Penn State

Mowry E. Goetz (Penn State, 1917), Presented an Address Entitled "Background of the Building of Wartime Specialty Steel Plants" at the Sixth Annual David Ford McFarland Award Meeting of the Penn State Chapter. Mr. Goetz (left), manager of operations, Cleveland District, Republic Steel Corp., was selected as the Awardee on the basis of his outstanding achievements in the metals industry. He is shown above with H. M. Davis, chairman of the Award Committee and professor of chemical metallurgy at Pennsylvania State College. (Reported by W. Barry Collins for Penn State)

Over 900 Attend Course On Practical Process Metallurgy at Worcester

The Worcester Chapter's educational course on "Practical Process Metallurgy" attracted a total of about 900 men and women from 100 Worcester industries, and from the attendance, a total of 103 people were present for all four of the lectures. Registration included representatives from companies in Hopedale, West Boylston, Westboro, Whitinsville, Worcester, Athol, Barre, Fitchburg and Boston. Over half of the companies registered were not members of the American Society for Metals, a great indication that the Chapter has a fruitful field for the aggressive membership campaign started this year.

The Educational Committee used a bulletin board notice, advance meeting flyer and individual meeting notices for each of the four subjects offered. All of the printing was done by the boys at the Worcester Boys' Trade High School as work projects. This, besides saving considerable publicity expense, provided an excellent opportunity for the Boys' Trade School to work on real promotional projects.

The course consisted of the following lectures:

"Mechanical Testing of Metals", by Francis G. Tatnall, manager of testing research division, Baldwin-Lima-Hamilton Corp.; "Production Processes", by W. P. Coomey, general superintendent, Rice Barton Corp., G. T. Rideout, abrasive engineer, Norton Co. and B. E. Warner, president, New England Plating Co. Inc.; "Heat Treating Operations on Steel", by H. J. Elmendorf, chief spring engineer, American Steel and Wire Division, U. S. Steel Corp.; and "Mining, Melting and Refining of Iron, Aluminum and Copper", by Joseph C. Danec, technical assistant to the production engineer, Norton Behr-Manning Overseas, Inc. — **Reported by Joseph C. Danec, Chairman of the Educational Committee for Worcester.**

Calumet Ladies Hear Talk on Microwaves

Speaker: F. W. Weideman

Illinois Bell Telephone Co.

The Calumet Chapter's Ladies Night meeting consisted of a demonstration of "Microwave Magic" presented by F. W. Weideman of the Illinois Bell Telephone Co. Entertainment was provided by the Standard Oil Co.'s Torchlighters, a vocal group made up of 30 male voices.

Mr. Weideman presented an interesting nontechnical talk and demonstration showing how microwaves, co-axial cable and other developments, such as the transistor and vacuum tubes, are used in the telephone art.

A miniature radio relay system was set up by Mr. Weideman and microwaves were transmitted from a miniature transmitter station. The effect that various metals and other objects have on these super-high frequency waves was demonstrated. The manner in which relay towers accept, amplify and re-transmit microwaves from coast to coast was discussed and the various problems presented by the topography of the country were described. The part these facilities play in everyday telephone service and in bringing television programs to this area was also discussed.—**Reported by K. R. Hine for Calumet.**

Explains Electric Furnace Brazing Procedures at Meeting in Minnesota

Speaker: H. E. Scarbrough

General Electric Co.

The Minnesota Chapter heard H. E. Scarbrough, industrial heating specialist from the Chicago office of the General Electric Co., speak on "Electric Furnace Brazing".

Mr. Scarbrough pointed out how furnace brazing has been essential in the development of household refrigeration and a big factor in the cost reduction of such varied items as bicycle frames and hubs, carbide-tipped tools and plumbing fixtures.

Furnace brazing is an extension of soldering in which an intermediate material of lower melting point than the materials to be joined wets and alloys to join close fitting surfaces with a strength approximating a solid piece. Soldering uses flux to reduce alloy-resisting oxide while the higher temperature furnace brazing uses reducing atmospheres.

It is possible to braze practically any material that the molter spelter will wet. The spelter can penetrate fits of anything less than scoring tightness, depending on the capillary attraction of the metal, but generally will not successfully fill voids of over 0.002 in. Various brazing materials are used from copper at close to 2000° F. down to the soldering range of 1300° F. Below 1300° F., reducing atmospheres cease to be effective and flux is necessary. Soldering generally costs about twice as much as brazing.

A question and answer period brought out that lead and zinc resist brazing. Terne plate cannot be brazed. Spelter for furnace brazing can be applied in wire form, as foil and in an ethylene glycol paste. Brazed parts must be held securely against movement while the braze hardens but clamps are not dependable at high temperatures.—**Reported by Knox A. Powell for Minnesota.**

Notes Properties Of Super High-Strength Steels

Speaker: A. E. Nehrenberg
Crucible Steel Co.

A few years ago, metallurgists believed that any steel with a tensile strength above 180,000 psi. was too brittle to be used in a structure; today, steels with a strength of 230,000 psi. are used in such important structures as aircraft landing gear. Alvin E. Nehrenberg, supervisor of the research laboratory of the Crucible Steel Co., who spoke before the Washington Chapter, likened this metallurgical advancement to the breaking of the sonic barrier in aerodynamics in a talk on "Super High-Strength Structural Steels".

The inspirations for the development of these super high-strength steels were: (1) Recent improvements in aluminum-based alloys, which gave them higher strength-to-weight ratios than steel at 180,000 psi; and (2) The insatiable demands of aircraft designers for stronger materials to enable them to make faster and lighter aircraft with longer range and greater pay-loads. The super steels are the answer of the steel metallurgists to these challenges.

Mr. Nehrenberg told his audience that there are three basic rules which must be observed in order to realize adequate ductility at high strength levels: The carbon should be no higher than is necessary to achieve the required hardness; the hardenability should be sufficient to insure 100% martensite at the center of the section; and the alloying elements should be so selected that platelet carbides do not precipitate at the tempering temperature.

The importance of low carbon was stressed by slides which showed that energy absorption in notch bar tests at a given strength level decreased as carbon increased. Mr. Nehrenberg pointed out that the carbon content of commercial steels which are intended for use at strength levels of 230,000 psi. was about 0.25%.

The importance of silicon in retarding the tempering reactions, and thus avoiding the well-known 500° embrittlement, was illustrated by several slides. If the silicon is high enough, the reaction which causes this so-called 500° embrittlement does not occur until the temperature reaches 600° or 700° F. Since the tempering temperature is well below this range, the steel is not subject to this type of embrittlement. It is for this reason that the super high-strength steels contain 1.5 to 2.0% silicon.

The fatigue properties of the new steels were compared with those of AISI 4340. Although the fatigue strength of unnotched specimens at room temperature of the two types of steel was not significantly different, the fatigue strength, up to 100,000 cycles, of notched specimens of the low carbon steel was higher than that of 4340. And, at low temperatures, the 4340 was inferior in tests up to 10,000,000 cycles.

The super high-strength steels, Mr. Nehrenberg concluded, are here to stay and will be used in an increasing number of applications in the years ahead.—**Reported by Richard Raring for Washington.**

Shows Films on Stainless Steel at Oregon Meeting

Speaker: T. R. Lichtenwalter
Republic Steel Corp.

"The Fabrication of Stainless Steel Equipment" was the subject presented before the Oregon Chapter by T. R. Lichtenwalter, Republic Steel Corp., at a meeting recently. Mr. Lichtenwalter briefly introduced two films which were shown. The first film, "Stainless Steels", gave a thorough picture of the position of stainless steels in this industrial age, and the second, "Metallurgy Plus", demonstrated precautions to be taken in the manufacture of stainless steels. An interesting question and answer period closed the meeting.—**Reported by J. E. Gustafson for Oregon.**

Heat Treating Course Popular at Syracuse

Attendance at the Meetings of Syracuse Chapter's Popular Course on the "Heat Treatment of Steel" Was Almost Double the Original Estimate of 200, and a Fifth Lecture Was Added to Round Out a Very Successful Program. Speakers at this extra lecture were W. C. Wheadon, director of the Institute of Industrial Research at Syracuse University, and Mel Coughenour, Carpenter Steel Co., who are shown in the front row nearest the camera. Mr. Coughenour is the present chairman and Bill Wheadon will assume the duties of that office for Syracuse's 1954-55 season. (Reported by J. A. Miskelly for Syracuse)

Encouraging Scientific and Engineering Manpower for the Future

Action Programs and Their Potentials

The following is a report on the program of the ASM Science Achievement Awards for Students and Recognition Awards for Science Teachers presented by Miss Helen E. Hale, Board of Education of Baltimore County, Towson, Md., chairman of the operating committee, at the convention of the National Science Teachers Association held in Chicago.

Introduction

In comparison with the major programs which have already been presented, it may seem that the program of Science Achievement Awards for Students and the Recognition Awards for Teachers is rather picayune. However, the sponsoring organization—the American Society for Metals—and all other people who have worked with the program during the past three years have some degree of faith that we have here a grass-roots type of approach to the scientific manpower problem which faces this country.

In the program we are attempting to reach junior and senior high school students, and science teachers and other educators at all levels from the kindergarten through the high school. The goals of the program are: To publicize among as many people as possible the need for scientific and engineering manpower — students, teachers, administrators and citizens; and to encourage and recognize the kinds of science learning experiences which will introduce able students to the ways in which scientists actually work and to get these students with potential for science excited about this kind of work.

How Does the Program Implement These Goals?

Most of you, I am sure, are familiar with the details of the program. In the student program the country is divided into eight regions. Student entries are sent to Regional Chairmen by May 15. There they are given preliminary judging by a Regional Judging Committee which includes classroom teachers, professional scientists, science educators and a representative of the American Society for Metals. Then, *all* entries are sent to the N.S.T.A. office for judging by a national committee set up with representation similar to that of the local judging committees. However, even at the national level, entries are evaluated only in relation to other entries from the same region. Approximately the same number of cash and bond awards are given in each region, i.e:

5 bonds to 7-8 graders
5 bonds to 9-10 graders
3 cash awards to 11-12 graders

In addition, honorable mention certificates are sent to outstanding entries which do not receive awards, and letters of recognition to all other entrants. You are probably also familiar with the gold pins which go to winners and the plaques which are presented to schools having winners.

In the teacher recognition program there is no regional organization but all entries are judged by a National Judging Committee.

Is the Program Making Any Impact on Students, Science Teachers and Administrators?

We can look at some of the facts and figures of the program since its inception in 1952. Promotional materials for the program have been widely distributed (15,000 pieces in 1952; 52,000 in 1953; and 60,000 this year). Presumably most of these pieces reached somebody, and, if nothing more, presumably each of these promotional pieces made somebody more aware of the scientific manpower problem than he was before he opened the morning mail.

The point that I am trying to make is that we feel that the program—along with TV shows, radio announcements and newspaper and magazine articles—is, to say the least, publicizing the need for increased attention to the scientific education of students, particularly of the gifted.

Further publicity is given when the awards are made to the students in their own schools. I understand that, without exception, the students receive their awards and the plaques are given at formal school assemblies and that, further, it has been possible for each of the schools to secure either an American Society for Metals or an F.S.A. representative to present the awards. These representatives have been able to make a real impression, not only on the student winners, but also on the entire student bodies and faculties of the schools of the winners.

The more important goal of the program concerns the encouragement and recognition of the kinds of science learning experiences which will stimulate and nurture gifted students. There is some cause for encouragement here also. The quality of the student entries has been very respectable indeed and there is some indication that the quality improved in 1953 in certain areas of the country where it was not outstanding in 1952.

However, the greatest cause for optimism seems to be in the Teacher Recognition Program. There is a growing feeling in the A.S.M. as well as in the office of John H. Woodburn, assistant executive secretary, N.S.T.A., that the teacher phase of the program is becoming increasingly important. Not only is this a unique aspect of the program—i.e., no other comparable feature exists in other science contests—but also people are coming to realize (perhaps, belatedly) the unbounded influence of a good teacher. As you know, the influence of a teacher permeates the student body, the faculty, the administration and the community.

The serious tone of this year's teacher entries, the improved quality over that of the two earlier years, the enthusiastic letters which have accompanied or followed some of the entries give one the feeling that there is a large corps of dedicated science teachers in the American schools and that any recognition we can give them will do much to encourage creative science teaching.

You may be interested in the kinds of problems with which the teacher entries are concerned. In this year's program, for example, teachers reported on such matters as:

A Technique for Measuring the Ability of a Pupil to Read Science Materials

Developing Appreciation of the Scientific Method in Biology.

Study Habits in Science

Helping Tomorrow's Scientists

Paper Models and Devices Useful in Teaching Physics and Mathematics

A Chemistry Program—Not Just a Class

And may I read just one excerpt from a letter received by Dr. Woodburn from one of this year's entrants:

"I have been trying to write this letter for two hours. How does one go about saying in a few words how thrilled he is at being selected for one of the awards? And how does one begin to thank the N.S.T.A. for the opportunity to win such an award? Do you know just how much winning means? It's not the monetary gain which matters. It means that I am

(*Continued on p. 15*)

Ft. Wayne Completes Heat Treat Course

Shown Conducting the Final Lecture of the Series of Educational Lectures on "Principles of Heat Treatment" Given by the Fort Wayne Chapter Are, From Left: C. E. Mereness, General Electric Co.; P. A. Lauletta, Joselyn Steel Co.; G. A. Warwick, General Electric Co.; and F. K. Jaessing, U. S. Rubber Co. (Photograph by G. R. Hemmeter for the Fort Wayne Chapter)

(*Continued from p.* 14)

on the right track in what I am doing. It means that my project will gain immeasurable stature and importance—and perhaps may spread more easily to other communities. For all of this I am most grateful."

Science teachers who are working with the energy and enthusiasm indicated in this letter, on real concerns such as those noted a minute ago, can be trusted to nurture the gifted science student, to encourage boys and girls to embark on scientific and engineering careers, to get students excited about science and to sustain this interest.

Of course, there are a number of unresolved problems in the Science Achievement Awards Program for Students and the Science Teachers Recognition Program; nonetheless, we feel that the endeavor is making a contribution to the problem confronting this panel.

The following letter was received from Stanley C. Pearson, assistant curriculum coordinator, Pasadena City Schools.

It was an honor to participate in the contest conducted by the Future Scientists of America Foundation and sponsored by your organization. I feel extremely fortunate in being one of the award winners and wish to express my sincere appreciation and thanks to the American Society for Metals for making this possible for me. It is indeed a splendid thing that your organization offers this encouragement to teachers and students alike who are interested in scientific progress. Thanks again!

Presents Status of Low-Temperature Brittleness Studies

Speaker: Robert M. Brick

University of Pennsylvania

Robert M. Brick, professor of metallurgy and director of the department of metallurgical engineering at the University of Pennsylvania, presented a down-to-earth talk on the "Present Status of Low-Temperature Brittleness Studies" at a meeting of the New Haven Chapter.

Dr. Brick gave a number of examples of catastrophic brittle fractures. These failures were not confined to welded ships alone, but involved welded and also riveted storage tanks and structures as well. Failures were not confined to one locality but took place all over the world.

The speaker pointed out that in an evaluation of brittleness, the tensile test was worthless but notched transition temperature was important. The basic remedy for brittle failure is to raise notch toughness and lower transition temperature.

He then discussed the following approaches to the problem:

(1). The practical research approach—What we can do to lower transition temperature and increase notch toughness.

(2). The economic or statistical research approach—How much it will cost to do this.

(3). The fundamental research approach—Why steel behaves as it does.

From the practical approach, a number of things can be done to eliminate brittle failures. Plate could be normalized, the finishing temperature could be reduced to 1550-1600° F. instead of 1750° F. or above, the C-Mn ratio could be increased to 3-1, fully killed steel could be used, the carbon alone could be lowered or notch tough steel could be used in critical areas and no failures would take place.

From the economic approach these remedies could have serious implications. For example: To normalize is costly, fully effective only on killed steel, and requires more furnace capacity than we presently have; to lower finishing temperature would slow production, increase mill wear and present problems in control; to raise the C-Mn ratio would increase cost and promote use of a material which is scarce in war; to use fully killed steel would also add to cost and there is not enough hot-top capacity available; if the carbon alone were reduced, less tensile strength would be obtained and research would be needed to establish whether better ships would result; to use notch tough steel in critical areas would again increase cost and would require further study of effectiveness.

Dr. Brick also discussed use of the V-notch Charpy test for determining transition temperature; the impact value necessary to eliminate failure; method of sampling a heat for acceptance; the effect of lowering tensile strength; the cheapest way to lower transition temperature; and improvement of ingot practice.

Under the fundamental research approach, Dr. Brick explored the effects of high purity, the effects of aluminum, silicon and oxygen, the effect of structure on brittleness and the relation between elastic strain and crack length. It was pointed out that these values are related to the fact that surface energy for forming two new surfaces (crack) must be supplied by elastic strain energy. In discussing the effects of quench and strain aging, the speaker noted that quench aging raises transition temperature and overaging reduces it.—**Reported by G. L. Whiteley for New Haven.**

Customer Training Program

The Great Lakes Carbon Corp., Niagara Falls, N. Y., has a customer education program on arc furnace electrodes which shows customers how to use its products. The program, designed for the men on the melting floor who actually wrestle with the electrodes, consists of three sessions of lectures and demonstrations which help them understand the why of proper electrode care and handling. The program can eventually contribute to lowering the costs of electric steel, and should ultimately increase the market for electrodes.

Metallurgical News and Developments

New Metallizing Process

A new line of metallized pressed steel pots for heat treating has been announced by the Eclipse Fuel Engineering Co., Rockford, Ill., which will make possible 200 to 300% longer life on some metal melting and heat treating operations.

Electrolytic Chromium

First commercial production of electrolytic chromium has been started at the Marietta, Ohio, alloy plant of the Electro Metallurgical Co., a division of Union Carbide and Carbon Corp. Output of the plant will be about 2000 tons a year when the electrolytic units are in full-scale operation. The new product will go mostly into the special high-temperature alloys used for jet engines, gas turbines and rockets.

Hydrogen-Cooled Generator

A hydrogen-cooled generator has been designed by Westinghouse Electric Corp. The copper coils of the unit are hollow to permit passage of the cooling hydrogen. The system cuts 87 tons from the weight of the generator.

Technical Reading

The Electronic Engineering Co., California, will pay two-thirds of the subscription price of a selected list of business papers and trade magazines for its employees if they will have the magazines delivered to their homes.

Aluminum Power Plant

Aluminum is used extensively in the power distribution system the Philadelphia Electric Co. is building for the 16,000-home development at Levittown, Pa. All overhead primaries, secondaries and service drops, underground street lighting cable and standards, brackets and luminaries are made completely or partially with aluminum.

Liquid Oxygen

Liquid oxygen will be produced and distributed at a plant soon to be built south of Chicago for the National Cylinder Gas Co. The $3.5-million plant, will be the fourth industrial gas plant in the Chicago area.

Zone Heating by Bell

A new method for refining germanium, used in transistors, and other materials, to almost perfect purity has been developed at Bell Telephone Laboratories, New York. The method, called zone heating, uses a special heating process to isolate the impurities for easy removal.

Aluminum Coupler

A new aluminum coupler for irrigation pipe is being produced by the Moore Irrigation Co., Corvallis, Ore. Connecting or disconnecting can be done from the center of a pipe and slack in the line or vibration won't disconnect it.

To Expand Refractory Line

The Babcock & Wilcox Co., New York, and the Seaboard Refractories Co., New Jersey, have concluded an agreement under which Seaboard's entire manufacturing facilities will be devoted to producing special refractories for B & W.

New Representative

The Claud S. Gordon Co., Chicago, has announced the appointment of Ralph E. Johnston as superintendent of their Chicago plant. Mr. Johnston joined the Gordon organization in 1949 and has been service manager in Chicago since that time.

Zirconium Moves to Ohio

The newest industry in northern Ohio is the Zirconium Corp. of America, third company in the country to produce zirconium. Using a new process, the company will turn out zirconium oxide in 4 or 5 hr. instead of the more common 48 to 72 hr. timing, and will push the national output of zirconium up 25%.

Case Offers Course

Case Institute of Technology, Cleveland, presented a short course on Operations Research June 7 to 18.

To Push Automobile Trade

General Motors Corp. has launched a campaign to drum up interest among young people in the retail automobile business. Career kits designed for presentations in high schools have been distributed to GM's more than 18,000 car and truck dealers. The kits contain a color movie, outlines of opportunities, and a guide for use by job counselors.

New Plastic Foam

Monsanto Chemical Co. is going into business with German chemists to produce a new plastic substitute for foam rubber. A new plant is being built which will turn out plastics for mattresses and upholstery.

Bethlehem Opens Furnaces

The Bethlehem Pacific Coast Steel Corp. has recently unveiled three electric furnaces at its Los Angeles mill. The furnaces have an annual capacity of 400,000 tons of ingots, and operate entirely on steel scrap.

Buehler Opens Plant

Buehler Ltd., well known in the metallurgical testing field, has opened a new plant in Evanston, Ill. The plant accommodates all the manufacturing facilities of the company as well as offices and a display room.

Lithium Award

To stimulate and reward research in the use of lithium in ceramics, Foote Mineral Co. is sponsoring their Second Lithium Award Program. A total of $2000 in cash prizes will be awarded to authors of the best papers describing heretofore unpublished development work. Complete details are available from. Lithium Award Chairman, Foote Mineral Co., 18 West Chelton Ave., Philadelphia 44, Pa.

Reaches Postwar High in Enrollment

Illinois Institute of Technology's cooperative education program has reached a postwar high in enrollment, but there still are more potential sponsors than applicants. Today there are 89 students, 21 more than in September 1953, enrolled in the co-op program, under which a student alternates periods of attendance in classes with employment. The program is offered in the metallurgical, electrical, industrial and mechanical fields. Under the work-study plan, it takes about 5½ years to receive a degree. Information about the plan can be obtained from: Coordinator of Co-Op Education, Illinois Institute of Technology, Technology Center, Chicago 16, Ill.

X-Ray Inspection

A portable X-ray machine is supplementing visual inspection of aircraft parts in the inspection department of Delta-C&S Air Lines, Atlanta, Ga. The new equipment eliminates some of the disassembling that is now necessary for routine checks.

Atomic Battery

An atomic battery that fires a standard photo-flash bulb has been developed by the Tracerlab. Inc., Boston.

Pittsburgh Hears Guided Missile Talk

Wolfgang H. Steurer, Redstone Arsenal, Who Discussed "Guided Missiles, Their Development and Their Metallurgical Problems" at the Past Chairmen's Night Meeting of the Pittsburgh Chapter, Is Shown Receiving the Congratulations of C. H. Cox, Jr., Technical Chairman of the Meeting

Speaker: W. H. Steurer
Redstone Arsenal

Wolfgang H. Steurer, chief of the materials laboratory, Redstone Arsenal, talked on "Guided Missiles" at Past Chairmen's Night of the Pittsburgh Chapter.

The talk was preceded by the showing of the U. S. Army television film, "The Big Picture", which depicted the launching and successful mission of one of the current guided missiles, the Nike.

Dr. Steurer traced the development of rockets from their start after World War I by the people interested in space travel, through the completion of the German V-2 rocket of World War II.

After V-E day, the U. S. Army brought a supply of V-2 guided missiles from Germany for research purposes. The V-2 rocket weighs 5 tons empty and carries 1000 gal. of alcohol and 1000 gal. of liquid oxygen. The total weight of the rocket when ready to fire is 14 tons. The alcohol and oxygen are fed to the rocket motor at a pressure of 600 psi. by a pump which requires 700 hp. The pump is run by steam generated from the reaction of hydrogen peroxide with sodium permanganate. The total time per power application in the V-2 rocket is approximately 60 sec.

The short times that some parts of the guided missiles have to withstand elevated temperatures have led to some interesting metallurgical research into tensile and creep properties of metals and alloys which have been at temperature for the short times of 15 sec. to 15 min.

Dr. Steurer and his associates have constructed various pieces of laboratory equipment which permit tensile and creep tests to be performed in very short times on specimens that were heated to temperature within a few seconds. Thus far, Dr. Steurer has elevated temperature properties for a few alloys in the range of zero time to 15 min. The strengths obtained in this time range are higher than the conventional high-temperature properties of these alloys.

Dr. Steurer continued with a discussion on the possibilities of space travel.

As the first step in the realm of space travel, it seems that it would be necessary to establish a satellite of the earth to be used as a jumping-off place. It is proposed that this man-made satellite will revolve around the earth at an elevation of 1000 miles with a speed of 15,000 miles per hr. Thus, this satellite would complete one revolution in about 2 hr.

Dr. Steurer left the audience with the impression that, given enough time, effort and money, this satellite, and consequently, space travel, were within the realm of possibility.

The meeting was closed with the running of a motion picture which showed the entire process of assembling, testing, fueling and launching a V-2 rocket.—**Reported by A. H. Grobe for the Pittsburgh Chapter.**

Past Chairmen Who Attended the Pittsburgh Chapter's Annual Past Chairmen's Night Meeting Included, Standing, From Left: T. W. Merrill, W. I. McInerney, Jerome Strauss, Norman I. Stotz, L. C. Whitney and F. W. Bremmer. Seated, from left, are: Charles M. Johnson, A. D. Beeken, Jr., and Edgar H. Dix, Jr.

Traces Developments In Aluminum Progress

Speaker: T. L. Fritzlen

Reynolds Metals Co.

The aluminum industry is still firmly based on bauxite and cryolite as raw materials, and on the Bayer process and the Hall cell as methods, just as it was when the industry was a new one early in the century. But this does not indicate technological stagnation, as was ably pointed out by T. L. Fritzlen, chief metallurgist of the Reynolds Metals Co., at a meeting of the Washington Chapter in a talk on "Developments in Aluminum". On the contrary, the industry has been experiencing a period of dynamic growth and development. For example, the 1953 production of aluminum was 1.25 million tons, 33% greater than 1952 and 74% greater than 1950. Mr. Fritzlen briefly described the known reserves of bauxite throughout the world, and concluded that proven domestic and Caribbean ores should last about a century at the present rate of consumption.

The bulk of Mr. Fritzlen's talk was a general survey of recent development in aluminum technology and covered such items as continuous casting, the heavy press program, new extruded shapes, cold welding, induction welding of aluminum alloy tubing, rolled ribbed sheet, tapered sheet, new alloys, aluminum gas-line pipe, aluminum finishes and powder metallurgy of aluminum. All of these efforts to increase the utility and versatility of aluminum alloys, and to enable them to satisfy the never-ending demands of engineers and designers, demonstrate the aggressive development program of the aluminum industry.

Mr. Fritzlen noted that research and development efforts not only take into account current material problems, but they anticipate future problems. One such problem will be the tonnage production of sheet for supersonic aircraft and missiles, which will be required to withstand the high temperatures generated by air friction. To meet this demand, aluminum alloys with yield strengths of 25,000 to 35,000 psi. at temperatures up to 700° F. will be needed.—**Reported by Richard H. Raring for the Washington Chapter.**

Register for Course in St. Louis

Signing Up Registrants Wishing to Participate in the St. Louis Chapter's Educational Course on the "Machining of Metals" Are, From Left: Julius Turk, Arthur H. L. Hunnius and Martin Huether. The course, consisting of five lectures, had an average attendance of 140 at each of the sessions

New Films

Shell Molding

Recent progress in techniques of shell molding is the subject of this new 18-min. black and white motion picture produced by the Monsanto Chemical Co. The film traces the development of resin shell binders and describes techniques of shell production, shell assembly and casting, and covers a wide range of shell production methods from crude manual operations to those involving huge multi-station machines which require manpower only for inspection purposes.

Requests for this film should be directed to: Mansanto Chemical Co. Plastics Division, Department SM, Springfield, Mass.

U. S. Steel Corp.

The 1954 edition of a catalog describing industrial motion pictures sponsored and distributed by the U. S. Steel Corp. can be obtained by writing to: G. J. Dorman, Motion Picture and Visual Aids Section, Advertising Division, U. S. Steel Corp., 525 William Penn Place, Pittsburgh 30, Pa. All the films are available on a free-loan basis for showing to recognized groups.

Mercast Process

Alloy Precision Castings Co. has announced that its 3-D slide film series on the Mercast process is available for presentation to chapters of the A.S.M. This is a set of 45 slides covering the progressive steps involved in making typical precision investment castings with the frozen mercury pattern technique. Two castings, a valve body for a TV picture tube evacuating pump and a radar wave guide are shown in each stage of production, from beginning to end. The films emphasize the advantages of Mercast processes in terms of the economies it affords in time, dimensional control, finish and other characteristics.

Alloy Precision Castings Co. personnel must accompany the slide films and deliver the narration. Services will be without charge to A.S.M. chapters. Requests should be made through: S. E. Flenn, sales manager, Alloy Precision Castings Co., East 45th and Hamilton Ave., Cleveland 14, Ohio.

Obituary

E. E. RIPPEY, Wichita Chapter, passed away suddenly in April. Mr. Rippey was chief inspector of the Cessna Aircraft Co. He had been a member of the Wichita Chapter for many years.

Oak Ridge Chapter Completes Series on Metals—Inside Out

The Oak Ridge Chapter, in conjunction with the metallurgy division of the University of Tennessee, has recently completed a series of lectures for the general public entitled "Metals—Inside Out".

The first lecture, given by E. E. Stansbury, professor of metallurgy at the University of Tennessee, was on the "Nature and Freezing of Metals". The mechanism of solidification and phase changes were taken up along with some considerations of what takes place when metals are cold worked.

Fred E. Carter of Baker Co., Inc., who spoke on "Precious Metals", discussed the uses of the metals of the platinum group, with a few highlights of the uses and production of the other "precious" metals. The uses and production of platinum, gold and silver were described in some detail. Dr. Carter gave the audience some idea of the extensive use of these metals by pointing out the places where they are utilized, either directly or indirectly, in materials that the individual uses each day.

Robert G. Chapman, gemologist at Kimball's Jewelers, Inc., Knoxville, spoke about "Precious Stones". The qualities necessary for a stone to be classified as gem quality (beauty, durability, rarity, popularity, fashioning and portability) were discussed and it was shown how they would apply to some of the lesser known stones. Gems are formed by solidification from solution, fusion or metamorphism and have a crystalline form. The physical and optical properties of gems were then discussed. The last part of the lecture was devoted to the varieties, grading and cutting of the best known of the precious stones, the diamond.

The fourth lecturer was Peter Patriarca, metallurgist at Oak Ridge National Laboratory, who spoke on "Welding, Soldering and Brazing". The lecture opened with a discussion of the different types of fusion welding and what was meant by the term. Mr. Patriarca described changes in the metal being welded and the welding material. Metals that undergo a phase change will usually give a weld that is of approximately the same hardness and structure as the original material. When the material does not undergo this transformation, the weld and surrounding area may be softer than the rest of the piece, as no phase transformation has taken place during heating.

William D. Manly, metallurgist at the Oak Ridge National Laboratory, gave the final lecture on the "Heat Treatment of Metals". He discussed the basic phenomena occurring in the strengthening of pure metals and alloys and the main strengthening methods — cold work, precipitation hardening and selective phase transformations. In pure metals, such as copper and aluminum, the only available means for strengthening lies in cold working the metal, whereas in some binary and more complex systems, precipitation or phase transformations are used. The heat treatment of steels depends greatly on the latter mechanism. The speaker reviewed the basic transformations that occur in the treatment of plain carbon steels and illustrated his remarks with the aid of University of Tennessee metallurgy students by performing "heat treatments" on a long strand of plain carbon steel piano wire using resistance heating. The basic differences in the physical properties of the cold drawn wire after a slow cool or a quench were shown.

At the conclusion of Mr. Manly's lecture, a panel discussion of the subjects of the entire series was held, during which the questions of members of the audience were answered by the various speakers. Following the panel discussion, 44 certificates for 100% attendance for the series were awarded—**Reported by Maxwell C. Gilbert for the Oak Ridge Chapter.**

Presents 25-Year Certificate at York

James B. Austin, A.S.M. National President, Presents a 25-Year Membership Certificate to Allen Floyd Whalen During the National Officers Night Meeting of the York Chapter. Dr. Austin gave a talk on "Magnification in Time in Metallurgical Operations". (Reported by John Gulya for York Chapter)

Gives Rules for Selection Of Steels at Rocky Mt.

Speaker: L. E. Simon

Electro-Motive Division—G.M.C.

The Denver Section of the Rocky Mountain Chapter heard L. E. Simon, chief metallurgist, Electro-Motive Division, General Motors Corp., speak on the "Selection and Specification of Steel" at a recent meeting.

Mr. Simon stated that the need for selecting steel arises when a new part is to be made or when the service of an existing part must be improved or in some way altered. The selection will be governed by the design of the part, the microstructure of the steel and the stress conditions to which the part will be subjected. For example, different designs of key ways will greatly alter the strength of a part. The microstructure of steel can be improved by heat treating. However, it is important that a steel be selected with sufficient hardenability without excessive cost. It then becomes necessary to know the quench response of each grade of steel. The Jominy test is commonly used to obtain this information. Finally, it may become necessary to prestress the part with a stress which opposes the load. This opposing prestress is generally compression. Some methods used for producing such a condition are carburizing, nitriding, subcritical quenching, induction hardening, flame hardening and peening.

Mr. Simons discussed how this technique was used to correct a serious failure on locomotive drive gears.—**Reported by Eugene Jiannetti for Rocky Mountain.**

Ultra-High Strength Steels Described at Los Angeles Meeting

Speaker: M. A. Melcon
Lockheed Aircraft Corp.

The results of a three year comprehensive program for the evaluation and application of "Structural Steels Heat Treated to Ultra-High Strengths" were described by M. A. Melcon of Lockheed Aircraft Corp. at a meeting of the Los Angeles Chapter held recently.

Spurred by the constant battle of the aircraft materials engineer to reduce the weight of airframe components by using stronger or lighter materials, the Lockheed Aircraft Corp. initiated a program to investigate the full utilization of the potentially advantageous strength-weight ratio of alloy steels heat treated to the 260,000 to 280,000 psi. level.

Mr. Melcon described the initial evaluation of SAE 4340 steel heat treated to 260,000 psi. Thorough investigation of this material in fatigue, impact and notch sensitivity did not reveal relative quantitative values below that of the high-strength aluminum alloys which were being successfully used in commonly accepted aircraft parts. In most cases, Mr. Melcon said, it was found that the properties of the high heat treat material were equivalent to or better than material heat treated only to the 180,000 to 200,000 psi. range. Tensile impact strength was one chracteristic in which this was observed, illustrating the lack of brittleness when employing the high heat treat.

Studies of the fatigue properties of the 280,000 psi. steel revealed that, for a large number of cycles

M. A. Melcon

at lower stress values, this material had a higher fracture stress than the same material heat treated to a lower strength.

Fabrication of aircraft components incorporating the advantages of ultra-high strength heat treatment was described by Mr. Melcon, who stated that little difficulty was encountered if proper processing control was observed. He emphasized the necessity for baking to avoid possible cracking from hydrogen embrittlement after grinding, plating, pickling or electrolytic cleaning.—**Reported by Ward W. Minkler for Los Angeles.**

Speaks in Milwaukee On the Newest Phases Of Hot Working Steel

Speaker: John J. B. Rutherford
Babcock & Wilcox Co.

"New Phases of Hot Working of Steel" was the title of the talk presented by John J. B. Rutherford, chief metallurgist, Tubular Products Division, Babcock & Wilcox Co., at a meeting in Milwaukee.

Mr. Rutherford discussed research which has been conducted to expand the field of available engineering materials by processing metals in forms never before used. He pointed out the increased forgeability obtained by tapping steel into a separately prepared ladle of lime-aluminum slag. A description of continuous casting practice which yields fine-grained material readily amenable to further hot work was also presented.

With the aid of colored slides and schematic drawings, rotary piercing of heated bar stock and the extrusion of seamless tubing using fiberglass as a lubricant were illustrated. Mr. Rutherford spoke of the success experienced in extruding 27% chromium alloy and closed his illustrated discourse by citing the advantages of hot worked steel—better mechanical properties, improved uniformity, simplified heat treatment and cheapest method to cook steel in large quantities.—**Reported by E. H. Schmidt for the Milwaukee Chapter.**

Traces Metallography of Ancient Iron and Steel At Penn State Meeting

Speaker: S. W. Poole
Republic Steel Corp.

S. W. Poole of the Canton metallurgical laboratory, Republic Steel Corp., was the guest speaker at a recent meeting of the Penn State Chapter. His subject was the "Metallography of Ancient Iron and Steel".

Mr. Poole stated that it has not been definitely established just when iron was first used, but iron beads dating to 4000 B.C. have been unearthed at El Gerzeh in Egypt. Upon analysis of one of these beads a nickel content of 7.50% was found, indicating this iron to be of meteoric origin. Other iron relics found and analyzed which antedate 1200-1000 B.C. have also proved to be of meteoric origin.

It is believed that the first purposeful production of smelted terrestrial iron for tools and weapons occurred about 1000 B.C. in northeastern Asia Minor. Evidence has been found to indicate that iron was also used in appreciable amounts in Central Europe at about the same period, as evidenced by the development of the early Hallstatt iron culture.

The English metallurgists, Carpenter and Robertson, concluded as a result of the metallographic study of a series of ancient Egyptian iron implements that carburizing, quenching and the advantages of heat treatment generally were understood many centuries before the Christian era.

The speaker discussed the famous Damascus blades which were made in ancient India. The microstructure of these very high carbon steel blades has been found to be a dispersion of spheroidal carbides of various sizes and degrees of segregation in essentially a pearlitic matrix. This steel, a fused crucible product, is very difficult to forge; nevertheless, the structure indicates that an elaborate forging process was performed at temperatures around the critical range, the end result of which was to produce the spheroidized microstructure.

Mr. Poole supplemented his lecture with a series of slides and showed the manner in which metallographic specimens were obtained as well as the analysis and microstructure of a series of ancient implements.—**Reported by W. Barry Collins for Penn State Chapter.**

Talks in Hartford on Forming of Titanium

Speaker: J. Walter Gulliksen
Worcester Pressed Steel Co.

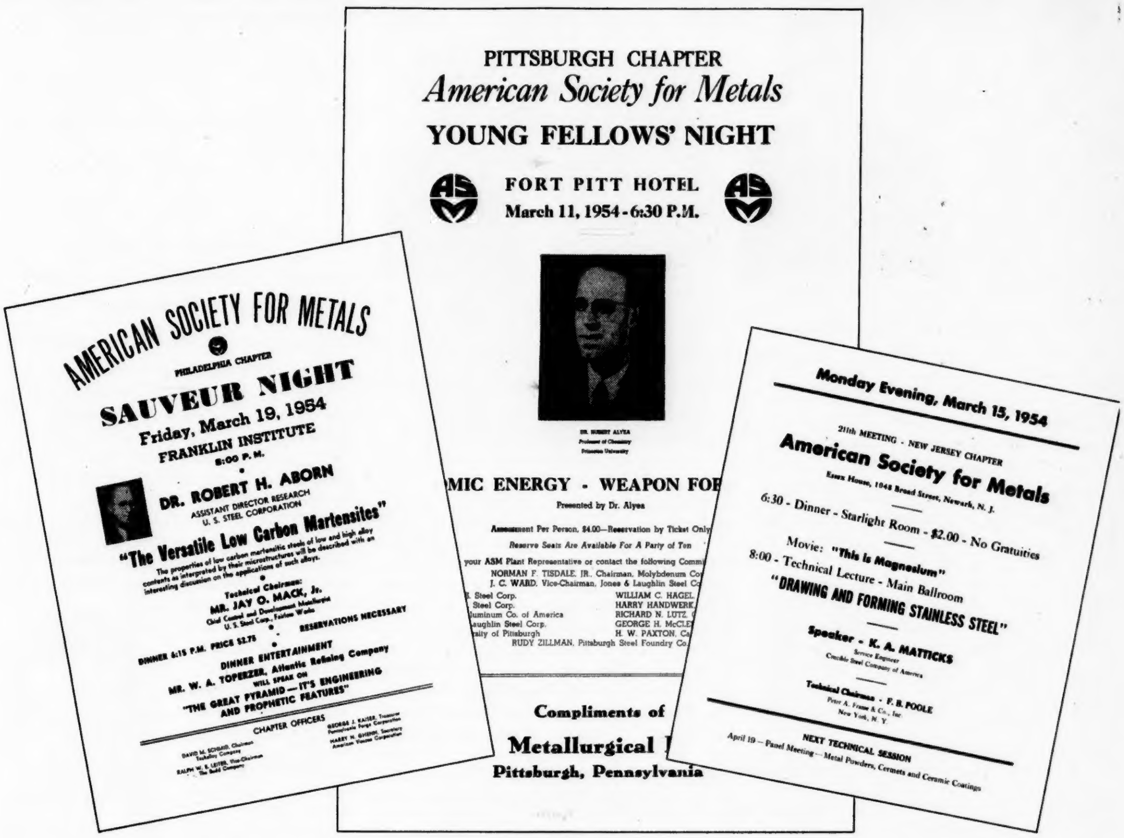
Experimental work on the "Forming and Deep Drawing of Titanium", the fourth most abundant metal in the earth, was the subject of a talk given by J. Walter Gulliksen, factory manager, Worcester Pressed Steel Co., at a meeting in Hartford.

Commercially pure titanium shows good plastic qualities in deep drawing at room temperature. Among the problems presented were the scoring and scratching of formed parts, the selection of the proper dies and the rapidity of work hardening.

Anodizing, dry film lubricants and carbide dies have proven to be the best combination in preventing scoring and scratching. Stress relieving after each draw has been found necessary to restore ductility and prevent season cracking.

Mr. Gulliksen stated that further tests are being made on a drawability comparison of commercially pure titanium and three different alloyed titaniums.—**Reported by E. G. Malmstrom for Hartford.**

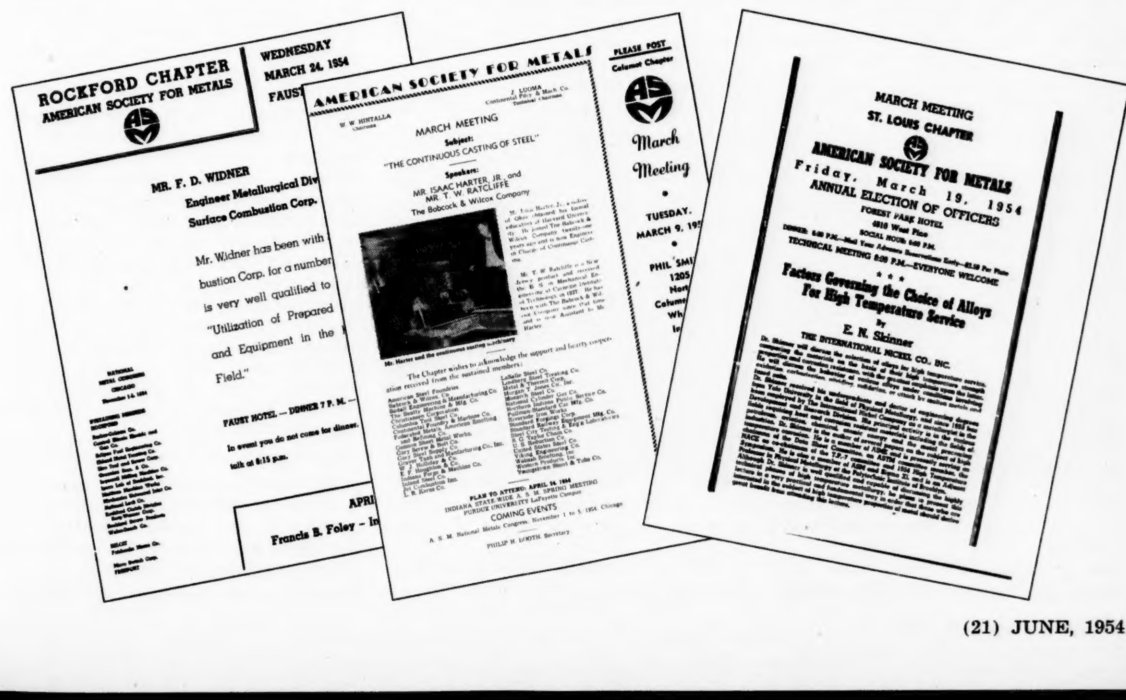
Meeting Program Awards


PITTSBURGH CHAPTER
American Society for Metals
YOUNG FELLOWS' NIGHT
FORT PITT HOTEL
March 11, 1954 - 6:30 P.M.
MIC ENERGY - WEAPON FO
Presented by Dr. Alyea
Compliments of
Metallurgical
Pittsburgh, Pennsylvania

AMERICAN SOCIETY FOR METALS
PHILADELPHIA CHAPTER
SAUVEUR NIGHT
Friday, March 19, 1954
FRANKLIN INSTITUTE
8:00 P.M.
DR. ROBERT H. ABORN
ASSISTANT DIRECTOR RESEARCH
U. S. STEEL CORPORATION
"The Versatile Low Carbon Martensites"
Technical Chairman:
MR. JAY O. MACK, Jr.
DINNER 6:15 P.M. PRICE $2.75
RESERVATIONS NECESSARY
DINNER ENTERTAINMENT
MR. W. A. TOPERZER, Atlantic Refining Company
WILL SPEAK ON
"THE GREAT PYRAMID — IT'S ENGINEERING AND PROPHETIC FEATURES"
CHAPTER OFFICERS

Monday Evening, March 15, 1954
21th MEETING - NEW JERSEY CHAPTER
American Society for Metals
Essex House, 1048 Broad Street, Newark, N. J.
6:30 - Dinner - Starlight Room - $2.00 - No Gratuities
Movie: "This is Magnesium"
8:00 - Technical Lecture - Main Ballroom
"DRAWING AND FORMING STAINLESS STEEL"
Speaker - K. A. MATTICKS
Technical Chairman - F. B. POOLE
NEXT TECHNICAL SESSION
April 19 — Panel Meeting — Metal Powders, Cermets and Ceramic Coatings

The Third and Last Competition for Awards for the Best Chapter Meeting Programs This Season Were Awarded to the Following Chapters: Above, Chapters With Over 500 Members: (1) Philadelphia; (2) Pittsburgh; (3) New Jersey. Below, Chapters With Fewer Than 500 Members: (1) St. Louis; (2) Calumet; (3) Rockford. Prizes were $25, $15 and $10 for first, second and third prizes in each of the classes


ROCKFORD CHAPTER
AMERICAN SOCIETY FOR METALS
WEDNESDAY
MARCH 24, 1954
MR. F. D. WIDNER
Engineer Metallurgical Div
Surface Combustion Corp.
Mr. Widner has been with
bustion Corp. for a number
is very well qualified to
"Utilization of Prepared
and Equipment in the
Field."
FAUST HOTEL — DINNER 7 P.M.
In event you do not come for dinner,
talk at 8:15 p.m.
Francis B. Foley

AMERICAN SOCIETY FOR METALS
PLEASE POST
Calumet Chapter
March Meeting
TUESDAY, MARCH 9, 195
MARCH MEETING
Subject:
"THE CONTINUOUS CASTING OF STEEL"
Speakers:
MR. ISAAC HARTER, JR. and
MR. T. W. RATCLIFFE
The Babcock & Wilcox Company
COMING EVENTS

MARCH MEETING
ST. LOUIS CHAPTER
AMERICAN SOCIETY FOR METALS
Friday, March 19, 1954
ANNUAL ELECTION OF OFFICERS
FOREST PARK HOTEL
Factors Governing the Choice of Alloys For High Temperature Service
By
E. N. Skinner
THE INTERNATIONAL NICKEL CO., INC.

Explains Toolsteel Failures at Carolinas

George J. Schad, Carpenter Steel Co., Discussed "Toolsteel Failures" at a Meeting of the Carolinas Chapter Held in Winston-Salem. Shown above, from left, are: J. R. Huntley, vice-chairman; Craig Phillips, coffee speaker; Mr. Schad; and W. J. Ervin, Jr., technical chairman of the meeting

Speaker: George Schad
Carpenter Steel Co.

The Carolinas Chapter heard a talk on "Toolsteel Failures" by George Schad, sales metallurgist, Carpenter Steel Co., at a recent meeting.

The principal causes of toolsteel failures, Mr. Schad stated, are: (1) The basic failure to select the proper steel for the required job; (2) Failure to completely remove the decarburized surfaces of the steel; and (3) Over-heating and hardening techniques. The audience was reminded that the higher alloy steels have a much narrower hardening range and cautioned against overheating toolsteels having a high alloy content.

Mr. Schad discussed the various quenching methods and, with the aid of excellent slides, illustrated the cracking in heavy sections after hardening. This type of failure is typical when the part is removed from the quench tank before the transformations are completed. The undue haste to temper heavy sections in order to avoid quench cracks is the principal cause of these failures. The "double draw" for parts having heavy sections was recommended.

Furnace atmosphere and its proper circulation plays an important role in the treatment of toolsteels. Many parts give unsatisfactory results due to the lack of proper circulation through openings in the tool being treated. Several slides illustrated the failure of this type. This lack of proper atmospheric circulation could, in many cases, be caused by improperly placing the part in the furnace. In discussing fatigue failures, the speaker pointed out that the part not being hard enough for the particular job was the most common reason for such failure. Other reasons for failure were abuse in grinding and poor design. Improper grinding produces local hot spots which are rapidly quenched by the remainder of the part which causes distortions and results in cracks. Lack of sufficient coolant on the surface being ground was given as the reason for most grinding cracks.

In summary, Mr. Schad mentioned that poor design in many cases was a contributing factor in toolsteel failures.—**Reported by James J. Hairston for the Carolinas.**

Metallurgy Information Meeting Held by U.S. Atomic Energy Commission

The Metallurgical Division of Argonne National Laboratory of the U. S. Atomic Energy Commission was host to 256 metallurgists from other A.E.C. operations and contractors in a "metallurgy information meeting" April 19, 20 and 21. Ten sessions were held wherein 70 papers were presented. Of 120 names appearing on the program, 73 or 61% were members of A.S.M. Topics discussed included metals and alloys required for reactor construction and their improvement as to dimensional stability, resistance to neutron bombardment, to heat and stress, and to corrosion and erosion. Other meetings were held on manufacturing methods for reactor elements—cladding, extrusion and hot work, welding and brazing. The only "open" or "unclassified" meeting was an evening cocktail party (sponsored by the University of Chicago) and a dinner. Toastmaster was Frank G. Foote A.S.M., director of the Metallurgical Division of Argonne National Laboratory. Ernest E. Thum, editor of *Metal Progress,* spoke on "Changing Vistas in Metallurgy", developing briefly the thesis that most of the important advances of metallurgy in America could—decade by decade—be ascribed to the commercial adaptation of an important contemporary idea or circumstance. Thus:

1880-1890: Mechanization of the steel industry.

1890-1900: Cheap electrical power in considerable quantity.

1900-1910: Ore from low-grade deposits.

1910-1920: Industry manufactures ordnance materiel.

1920-1930: Metal treatment integrated into mass production.

1930-1940: Economy—cutting out the frills.

1940-1950: Electronics, jets and big aircraft.

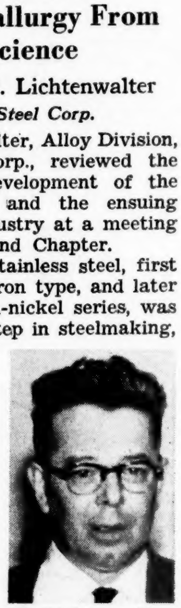
1950- : Atomic energy for power.

How Stainless Steels Changed Metallurgy From An Art to a Science

Speaker: T. R. Lichtenwalter
Republic Steel Corp.

T. R. Lichtenwalter, Alloy Division, Republic Steel Corp., reviewed the story of the "Development of the Stainless Steels" and the ensuing growth of the industry at a meeting of the Puget Sound Chapter.

The advent of stainless steel, first as the chromium-iron type, and later the 18-8 chromium-nickel series, was not only a great step in steelmaking, but represented one of the greatest developments in the metallurgy of ferrous alloys. This was a milestone in the transition of the "art of metalmaking" to the "science of metallurgy".



T. Lichtenwalter

One of the first uses for the chromium irons, as Mr. Lichtenwalter pointed out, was in the manufacture of cutlery. Its uses multiplied as the material was made available and as it was improved in quality. The 18-8 series led to general usage in the chemical, dairy and textile industries, until today stainless steels are used in all industries and new uses are being found daily.

By bringing forth the stainless steels, metallurgists provided mankind with an infinitely useful and versatile material. This material has been so universally demanded by industry that today the only reason for limitation of its use is because of short supply of the more critical alloying elements.

Thus, the metallurgist has produced for himself another great problem, that of devising a replacement for stainless steel without using large amounts of critical materials.—**Reported by Eugene E. Bauer for the Puget Sound Chapter.**

ASM publishes monthly *Metal Progress,* "the engineering magazine of the metals industry", recognized and accepted as the top magazine in the field.

Discusses Copper-Base Alloys at Meeting of St. Louis Chapter

Speaker: H. A. Ball
Olin Industries, Inc.

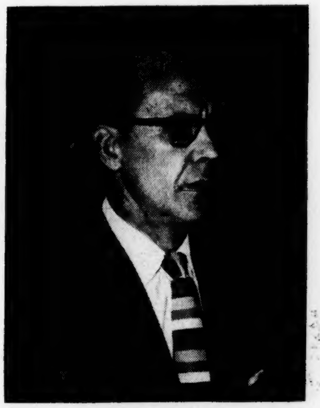
The St. Louis Chapter recently heard Herbert A. Ball, quality control superintendent of the Metals Division of Olin Industries, Inc., speak on "Copper-Base Alloys—Their Applications and Properties".

Mr. Ball described a few of the many changes which have been made in the brass mills in the last 30 years. Reference was made to melting and casting procedures which have shown a growth from a 100-lb. casting for rolling to the present casting which may approach 3000 lb. Other changes relating to rolling and annealing equipment were also discussed.

The use of strip copper and brass in the manufacture of automotive radiators was described. It was also pointed out that high quality and close gage requirements for the manufacture of ammunition components were very exacting.

Stress corrosion cracking, hydrogen embrittlement and fretting corrosion, and the precautions necessary to avoid such troubles, were pointed out by the speaker.

A new hot roll bonded product being produced by Olin Industries at East Alton, Ill., was exhibited. The product, in one application, is being used as an evaporator for home refrigerators. The process is applicable not only to copper and copper-base alloys but also to aluminum and aluminum alloys as well as stainless and ferrous alloys.



H. A. Ball

In conclusion a movie was shown which illustrated many of the operations in the production of brass strip in addition to some of the finished and semifinished fabricated articles which are produced by the company's Metals Division.—**Reported by Frank Delaplane for St. Louis.**

IMPORTANT MEETINGS
for July

July 12-15—American Electroplaters' Society. Annual Convention. Statler Hotel, New York. (D. Gardner Foulke, Executive Secretary, A.E.S., 473 York Rd., Jenkintown, Pa.)

July 16-21—International Council of Scientific Unions. International Conference on Electron Microscopy. London University, England. (C. E. Challice, Institute of Physics, 47 Belgrave Square, London S.W. 1, England.)

Semiconductors Featured In Talk at New York

Speaker: W. G. Pfann
Bell Telephone Laboratories

The final meeting of the season for the New York Chapter featured W. G. Pfann of the Bell Telephone Laboratories. He gave a talk on "Semiconductors" in which he emphasized the metallurgical aspects of transistor and diode design and explained their manufacture.

Mr. Pfann's particular contribution to the field, the zone-melting technique for ultra purification, was the highlight of the evening's talk. A short discussion of the theory rounded out this excellent talk.—**Reported by I. M. Hymes for New York.**

Developments in Fusion Welding Topic in Oregon

Speaker: C. B. Robinson
Air Reduction Pacific Co.

The Oregon Chapter heard C. B. Robinson, supervisor of process promotion, Air Reduction Pacific Co., speak on "Recent Developments and Applications in Fusion Welding".

During the war, great strides were made in the development of welding equipment which would use a continuous consumable welding rod during continuous production welding of aluminum and other hard-to-weld alloys, the speaker stated. Three patented processes were developed, one being the Aircomatic process of the Air Reduction Co. This process uses a visible arc, no fluxes and an enveloping inert gas around the arc. Argon and helium are the most popular gases being used at the present time. Magnesium and titanium are two of the newer metals being welded successfully by this method.

In conjunction with a film, Mr. Robinson discussed the actual application of the Aircomatic process and the construction of the tools used. In addition, a film was shown which clearly illustrated the actual depositing of the welding rod onto the molten metals during the welding process.—**Reported by J. E. Gustafson for the Oregon Chapter.**

National Officers Meet in Peoria

The Peoria Chapter Honored National President J. B. Austin (Front Right) and Secretary W. H. Eisenman (Front Left) at Its National Officers Night Meeting. Standing are William Franks (left), chairman, and G. C. Riegel, chief metallurgist, Caterpillar Tractor Co., technical chairman

Lower Lakes Regional Conference

Shown During the Meeting of the Lower Lakes Regional Conference Which Was Held in April Are, Top, From Left: L. M. Smith, Eastman Kodak Co.; Gil Cox, International Nickel Co.; W. A. Pennington, Carrier Corp., A.S.M. National Treasurer; and J. Convey, Director of Mines and Technical Surveys, Canada, Dinner Speaker. Center, from left (in foreground); R. Hendrickson, Bausch & Lomb Co.; J. Hoffer, vice-chairman, Rochester Chapter; P. Stoehr, Bausch & Lomb Co.; and Dr. Convey. Bottom, from left: M. D. Coughenour, Syracuse chairman; National President J. B. Austin; R. Guinan, Rochester chairman; National Secretary W. H. Eisenman; and F. Albers, Rome chairman. (Photographs by N. B. Iannone)

The Rochester Chapter was host for the Lower Lakes Regional Conference held jointly with the Buffalo, Northwestern Pennsylvania, Ontario, Rome, Southern Tier, Syracuse and Western Ontario Chapters of the American Society for Metals.

Capacity crowds attending the Conference heard 12 technical papers and also visited the Pfaudler Co., the camera works plant of the Eastman Kodak Co., the Taylor Instrument Co., and the Rochester Products Division of General Motors Corp.

Two of the conference speakers, J. B. Austin, A.S.M. president and director of research, U. S. Steel Corp., and J. Convey, director of the Department of Mines and Technical Surveys, Canada, engaged in a radio broadcast on "Let's Look at Metals" as a local publicity effort for the Conference.—**Reported by Sydney Gamlen for the Lower Lakes Regional Conference.**

Compliments

To JOHN A. BENNETT of the National Bureau of Standards on receiving the Department of Commerce Silver Medal for Meritorious Service. The award was made for "very valuable contributions in the field of metallurgical science and technology, with particular reference to the mechanism of fatigue failures in metals, and for meritorius authorship. Mr. Bennett, chief of the mechanical metallurgy section of the Bureau, is a past chairman of the Washington Chapter.

♦ ♦ ♦

To RICHARD L. TEMPLIN, assistant director of research and chief engineer of tests, Aluminum Co. of America, on being selected to present the third H. W. Gillett Memorial Lecture of the American Society for Testing Materials. Mr. Templin will deliver a lecture on the "Phenomenon of Fatigue of Metals and the Mechanism of Fatigue Failure" during A.S.T.M.'s Annual Meeting to be held in Chicago, June 13-18, 1954.

♦ ♦ ♦

To EMILIO JIMENO of the University of Madrid, Spain, on being awarded the title of Doctor in Engineering by the Engineering College of Hanover, Germany, in recognition of his many contributions to the fields of chemistry, metallurgy and corrosion.

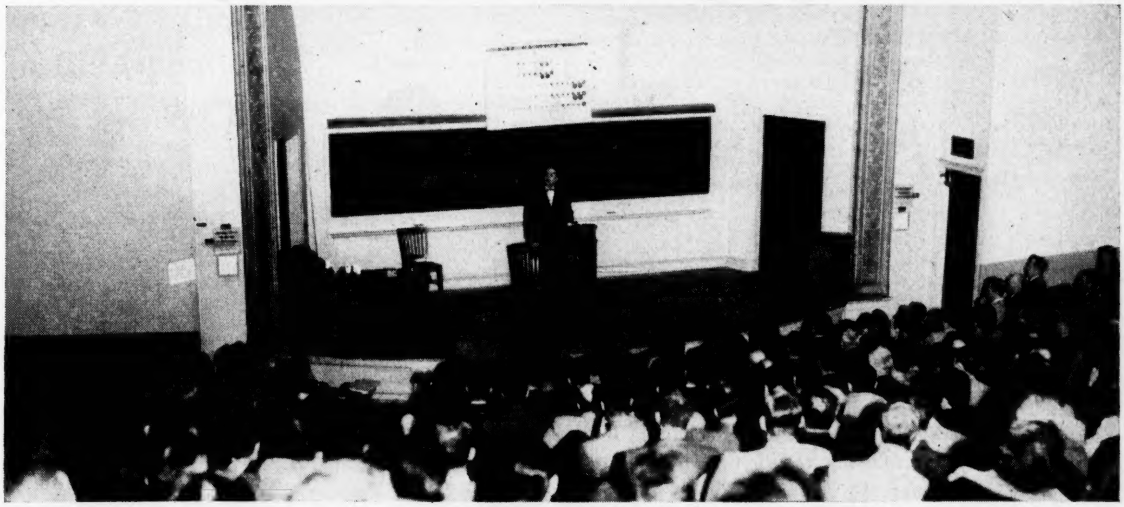
Akron Hears Eisenman

The Akron Chapter heard W. H. Eisenman, national secretary A.S.M., speak on "A.S.M.—A World-Wide Organization" at a recent meeting. The coffee speaker, Richard B. Wright, vice-president of the Wright Tool and Forge Co., spoke on a western trip he had made and showed many interesting slides. — **Reported by Richard E. Miller for Akron.**

Summer Job List Available

The American Society for Metals has ready and available a list of job opportunities for 1954 summer employment for metallurgical and other engineering students. The list has been mailed to all engineering schools in the United States and Canada for the attention of those students who wish to continue contact with their technical studies while earning money during their vacation from the classroom. Additional copies of the list may be obtained by writing to A.S.M. Headquarters, 7301 Euclid Ave., Cleveland 3, Ohio.

Puget Sound Course Draws Capacity Crowds



Evidence of the Popularity of the Puget Sound Chapter's Recently Completed Course on the "Nature of Metals" Was the Large Audience Which Attended Each Meeting. More than 100 persons were turned away for lack of space

The Puget Sound Chapter recently completed its annual educational program—the most successful in the Chapter's history—consisting of five lectures and a field trip, entitled "The Nature of Metals." A total of 377 individuals were registered, with more than 100 turned away due to lack of available space in the lecture hall. Of those registered, 355 attended five or more sessions and were given diplomas. The program was designed for nontechnical men working with metals.

Briefly, the program consisted of lectures on "Fundamentals" by E. A. Rowe, professor of metallurgy at the University of Washington, "Properties of Metals" by Blake D. Mills, Jr., professor of mechanical engineering at the University of Washington, "Aluminum and the Light Metals" by A. L. Mowry of Kaiser Aluminum and Chemical Corp., "Copper and Its Alloys" by John Ziegler of Revere Copper and Brass Co., "Iron and Steel" by D. C. Wilde of Columbia-Geneva Steel Division of U. S. Steel Corp., and a tour of the Bethlehem Pacific Coast Steel Corp. plant in Seattle.—**Reported by L. F. Franz for the Puget Sound Chapter.**

French Metallurgists to Meet

The annual autumn meeting of the French Society for Metallurgy will be held in Paris from Oct. 25 to 30, 1954. An advance program containing resumes of the papers to be presented will be distributed in July of this year to those who request it. Further information can be obtained from: P. Lacombe, Secretary General, Societe Francaise de Metallurgie, 25, Rue de Clichy, Paris (9), France.

Aluminum Casting Alloys Discussed at New Orleans

Speaker: D. L. Colwell

Apex Smelting Co.

Donald L. Colwell, director of laboratories, Apex Smelting Co., presented a talk on "Aluminum Casting Alloys" at a meeting in New Orleans. Mr. Colwell described the A.S.T.M. aluminum numbering system and how it differs from other systems.

The role of alloying elements was discussed in detail. The first of these, copper, was used as the principal alloying element in the original aluminum alloys. It is now usually used in conjunction with other alloying elements and rarely used alone to alloy with aluminum. Copper, when used with silicon, is found to produce alloys with better castability. Machinability is fair and can be improved by heat treatment. The next alloying element discussed was silicon. Aluminum-silicon alloys cast very well and have good resistance to corrosion; however, their strength is low and so silicon is usually used with copper or magnesium in aluminum alloys.

Magnesium, when used in an aluminum alloy, is found to give aluminum more resistance to corrosion and adds strength, but castability is very poor and some castings are impossible to make.

Mr. Colwell also discussed alloying elements such as iron, manganese, titanium, boron, nickel, chromium and zinc. Despite the generally held opinion that zinc up to 2% or more has a deleterious effect on castability and corrosion resistance, it has been found through repeated tests that, to the contrary, it has a beneficial effect. Two to 3% zinc is helpful in most aluminum-silicon-copper alloys.

Mr. Colwell closed with a brief description of the aluminum alloys containing the ternary hardening compounds of zinc, magnesium and aluminum which develop strengths and elongations without heat treatment in excess of the usual strengths of heat treated alloys.—**Reported by Sherman Faught for New Orleans.**

Gives Material Problems Of Nuclear Reactors

Speaker: Frank G. Foote

Argonne National Laboratory

At the final technical meeting of the Syracuse Chapter this season, Frank G. Foote, director, metallurgy division, Argonne National Laboratory, discussed "Material Problems in Nuclear Reactors".

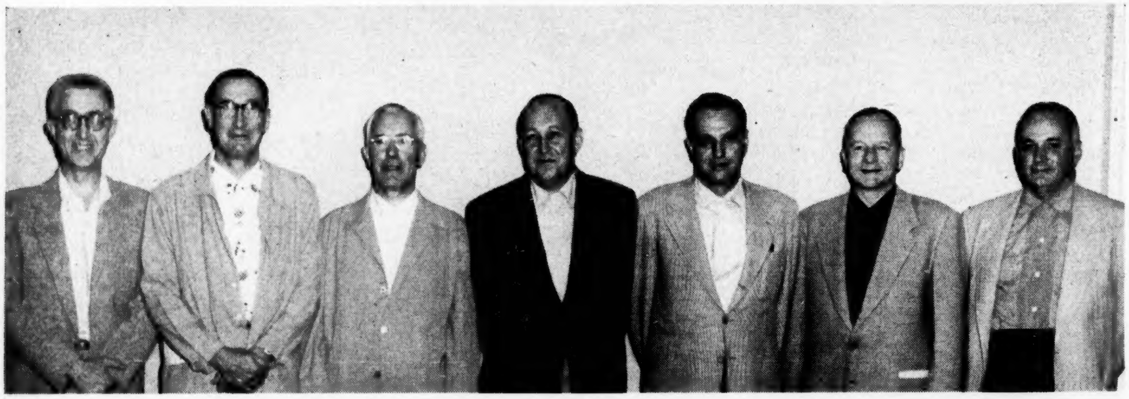
Dr. Foote's talk was most interesting, particularly from the standpoint that the metallic materials selected for reactor use are chosen for properties that are foreign to the normal applications of these metals. From charts shown by Dr. Foote, it was clearly brought out that only a few metals can be used economically in nuclear reactors.

The original problem of removing and then losing the heat from nuclear reactors has been changed to the problem of getting this vast heat energy released to commercial use.—**Reported by J. A. Miskelly for the Syracuse Chapter.**

Chicago Enjoys Ladies Night

The Chicago Chapter held its annual Ladies Night party at the Svithiod Singing Club recently. A roast beef dinner was served, followed by entertainment and dancing.—**Reported by J. A. Erickson for the Chicago Chapter.**

Furnace Men Plan Panel Sessions For Metal Show



Members of the Public Relations Committee of the Industrial Furnace Manufacturers Association Who Attended the Spring Meeting to Plan Panel Sessions to be Presented Under the Auspices of the American Society for Metals at the National Metal Congress and Exposition in Chicago Included, From Left: C. H. Vaughan, Electric Furnace Co.; C. F. Olmstead, Lee Wilson Engineering Co.; H. M. Heyn, Surface Combustion Corp.; C. H. Stevenson, Lindberg Engineering Co.; William Adam, Jr., Ajax Electric Co.; William Benninghoff, Tocco Div., Ohio Crankshaft Co.; and A. E. Tarr, Leeds and Northrup Co.

During its recent Spring Meeting at Hot Springs, the Industrial Furnace Manufacturers Association approved plans for panel sessions under the auspices of the American Society for Metals during the forthcoming National Metal Congress and Exposition in Chicago.

Three panels will be presented during the Metal Show. The first will take place Tuesday morning, Nov. 2, at the Palmer House. The second and third will be presented Tuesday and Wednesday afternoons Nov. 2 and 3, at the International Amphitheatre.

Furnace and induction heating practices will be covered by the three panels with both the subjects and the panel members to be determined by the public relations committee of the Association. Chairman of the committee is C. H. Stevenson, vice-president, Lindberg Engineering Co. Other members include: C. H. Vaughan, sales manager, Electric Furnace Co.; C. F. Olmstead, president, Lee Wilson Engineering Co.; H. M. Heyn, sales manager, heat treat division, Surface Combustion Corp.; William Adam, Jr., president, Ajax Electric Co.; William Benninghoff, manager, Tocco Division, Ohio Crankshaft Co.; and A. E. Tarr, manager, sales engineering division, Leeds and Northrup Co.

The Industrial Furnace Manufacturers Association represents leaders in the furnace, combustion, induction and dielectric heating fields.

Los Angeles Men Tour Bethlehem Plant

More Than 370 Los Angeles Chapter Members Toured the Bethlehem Pacific Coast Steel Corp. During a Recent Meeting. Inspecting the wire mill facilities are, from left: R. J. Tremblay, general superintendent of the plant; Jack Dickason, general manager, metal control laboratory, Chapter secretary; and Chairman J. A. Chalk, metallurgical engineer for the plant

Presents Industrial Uses Of Conductivity Machines

Speaker: Gordon Baumeister
Magnaflux Corp.

The Kansas City Chapter heard Gordon Baumeister, research engineer, special products department, Magnaflux Corp., speak at a recent meeting on "Conductivity, Its Industrial Application".

Mr. Baumeister noted the uses of the new Magnatest conductivity meter model FM100. This instrument is made in Germany and is marketed by Magnaflux in the United States. Its application is quite versatile in the nonferrous and nonmagnetic metals. The instrument is electronic in nature and makes use of eddy currents to determine different analysis of similar metals or differences in hardness of like metals. The average penetration of the current is 0.060 in. This instrument can also be used on austenitic stainless steels.

Mr. Baumeister pointed out that special calibrations of this machine are also in use at various plants in the aircraft field. Model FM102 has been developed for low-range conductivity metals such as titanium, uranium, etc.

A portion of the talk was devoted to "New Horizons in Computers" and a mock-up of a new type of computer was demonstrated.—**Reported by Bob Scrom, Jr., for the Kansas City Chapter.**

Cites Efforts to Increase Efficiency In the Openhearth

Speaker: E. L. Wentz
U. S. Steel Corp.

E. L. Wentz, divisional superintendent of steel production at the Ohio Works of the United States Steel Corp., addressed a meeting of the Northern Ontario Chapter on the subject "Openhearth Furnace Design and Operation".

The talk centered around the efforts made at the Ohio Works to increase production rate and efficiency in the openhearth shop. Emphasis was placed on increased firing rate, shorter charge times, scrap preparation and allocation and the reduction of delay times.

Firing rate, from start-charge to hot metal addition, was increased, and the bath kept open as long as possible. Average heat input dropped from 3,960,000 B.t.u. per ton in 1950 to 3,690,000 B.t.u. per ton in 1953. In spite of this increase in firing rate, roof life increased slightly.

Short charging times were found to correlate with short tap-to-tap times. In 1953, the average charging time was 1 hr., 35 min. To insure reduced charging time, scrap was classified daily, bundled, and placed in the sequence required at the furnaces. A public address system affords improved communications in the shop.

As a result of these and other steps taken to increase production efficiency, the average tap-to-tap time on 160-ton furnaces was reduced from 11:08 hr. in 1950 to 9:11 hr. in 1953.

The ideal heat time suggested by the Ohio Works for its furnaces is 8 hr., 30 min., tap-to-tap, and is comprised of the following:

Making bottom and banks	50 min.
Charging	1 hr. 15 min.
Charge to hot metal	1 hr.
Hot metal to flush	2 hr.
Lime boil and working period	3 hr. 25 min.

Mr. Wentz's talk, illustrated with numerous slides, was concluded with an informative question and answer period.—**Reported by J. G. Underwood for Northern Ontario Chapter.**

O.E.E.C. Technical Books

The Organization for European Economic Co-operation (O.E.E.C.) has informed A.S.M. Headquarters that several books are now available which would be of interest to metallurgists and those in allied fields. The publications are:

Nonferrous Heavy Metal Fabrication in the U.S.A., by O.E.E.C. Technical Mission No. 79, 252 p., 50 illustrations. Price $2.50. (Technical Mission No. 79 was one of the groups in America for the World Metallurgical Congress in 1951).

European Foundries and Productivity—Some Recent Experiments and Achievements. (1953). 270 p., 124 photographs and drawings. Price $3.00.

Manganese in the Iron and Steel Industry—Use, Recovery, Supplies. (1953). 48 p. Price $.75.

Galvanizing Techniques in the U.S.A. 138 p. Price $2.00.

Boron Steels—Production and Use. 140 p., 50 illustrations. Price $2.00.

These books may be ordered from O.E.E.C. Mission, Suite 61, 2002 P St., N.W., Washington 6, D. C.

Literature Classification Adopted in Italy, and Is Considered by UNESCO

The Italian Association of Metallurgy has announced its official decision to adopt the ASM-SLA Classification of Metallurgical Literature for all of its bibliographical purposes, including the classification of abstracts in the journal of the Society. The Classification has also been adopted by the Istituto Siderurgico "Finsider", holding company for the iron and steel industry in Italy.

These announcements were made by Professor Antonio Scortecci, who is chairman of the directing committee of the new Center for Metallurgical Bibliography of the Italian Association of Metallurgy.

This is regarded as an important step toward world standardization of metallurgical classification. Another important step in this direction was consideration of the ASM-SLA Classification by the UNESCO Advisory Committee for Documentation in the Natural Sciences at a meeting in Paris, Feb 15 through 17, 1954.

At this meeting Erich Pietsch, director of the Gmelin Institut fur anorganische Chemie of Germany, said that he is considering the possibility of applying this classification to the work of the Gmelin Institut for subjects related to metallurgy.

After a considerable amount of discussion, the UNESCO committee agreed to take steps to bring the ASM-SLA Classification to the attention of metallurgical organizations in potentially interested countries.

NYU Meeting Features Steel Technology

John W. W. Sullivan (Center), American Iron and Steel Institute, Spoke on "Statistical Methods in Steel Technology" at a Joint Meeting of the New York University Chapters A.S.M. and A.I.M.E. He is shown with Curtis M. Jackson (left) and James B. Melehan (right), past chairman and present chairman of the University Branch of the New York Chapter A. S. M.

Speaker: John W. W. Sullivan
American Iron and Steel Institute

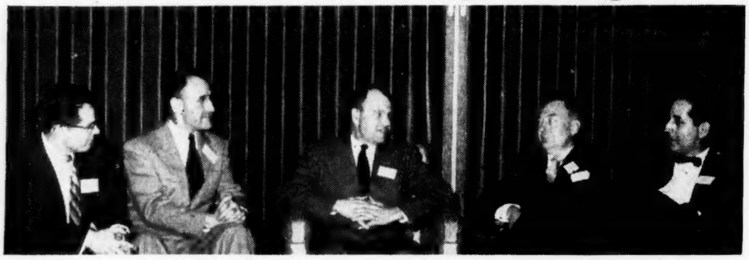
"Statistical Methods in Steel Technology" was the topic of the talk given by John W. W. Sullivan. metallurgical engineer, American Iron and Steel Institute, before a joint meeting of the New York University Chapters A.S.M. and A.I.M.E.

Mr. Sullivan discussed variability as associated with raw material, process, product or operating workmen. The control of variability with the aid of statistical methods was described by means of the following metallurgical case histories:

(1) Hardenability bands for constructional alloy steel; (2) Control of coating weight of hot-dipped galvanized wire; and (3) Hot-dipped tin plate, sampling inspection compared with 100% inspection.

The statistical methods concerned the application of the normal curve or curve of error, charts for average and charts for range, and the operating characteristic curves for an attribute sampling plan.—**Reported by Edward J Mullarkey for New York University Chapter.**

Discusses Trends in Engine Progress



Darl F. Caris, Head, Automotive Engine Department, General Motors Corp., Spoke on "Future Trends in Engine Progress" at the Past Chairmen's Night Meeting of the Chicago Chapter. Shown from left are: Otto Zmeskal, retiring chairman; J. A. Kubic, elected chairman; Mr. Caris; Morris Evans, technical chairman; and C. H. Samans, the recently elected vice-chairman

Speaker: Darl F. Caris
General Motors Corp.

The Chicago Chapter heard Darl F. Caris, head of the automotive engine department of General Motors Corp., speak on "Future Trends in Engine Progress," recently.

Mr. Caris described some of the tests and results of the tests performed at the proving grounds at Phoenix, Ariz. The tests were performed with 1915, 1935, 1951 and 19xx Cadillacs. Data concerning the performance and economy of these and other tests which showed the continued progress that has been made in the last 35 years were presented. The speaker projected these data and predicted that the trend in the automotive industry would continue to higher compression engines requiring higher octane fuels. Other means of increasing mechanical octane numbers will also be employed, such as improved engine design. The relationship between transmissions and engines will become more compatible, resulting in at least a 25% increase in efficiency. With the advent of the light metals coming into their own, along with plastic, the weight of the cars in the future will be reduced 15 to 25%. This, too, will increase gas mileage and increase engine performance.

Why more horsepower? Engines are made to produce horsepower and along with increasing economy and performance, the increase in horsepower is inevitable. Engines will be designed in closer relationship to the automatic transmission, with only slight increases in over-all speed, but with more ability for acceleration in passing, especially at high speeds. Lower axle ratios with better economy are also a trend for the future.

While the General Motors Corp. and the Chrysler Corp. have both done much work which has been publicized on the gas-turbine engine, there still is much to be desired. The gas turbine must not only meet all the requirements of tomorrow's engines, but be capable of doing a better job. It, above all, must have customer acceptance.

Some of the pros in favor of the turbine were discussed, namely: It has a high power-to-weight ratio, maximum torque at stall, built-in torque converter, uses low-grade fuel, simple ignition system, simple lubrication system, no reciprocating parts when perfectly balanced and easier cold starting. The cons on the subject are: High fuel consumption, high idle speed, high rotative speed, large air ducts, high operating temperatures, expensive materials of construction and low braking torque. After discussing the pros and cons, the speaker stated that the gas turbine will probably remain in the automotive research and development picture for some 10 to 15 years, after which time he sees some possibility of its use in commercial transportation.

This meeting, the annual Past Chairman's Night, was also the occasion for presentation of 25-year A.S.M. Certificates to Lewis S. Bergen, Jules Escheman, O. M. Fether, George P. Halliwell, P. E. Holder, Clyde Llewelyn, J. Walter Scott, Walter H. Weinwurm and the Driver-Harris Co. In addition, nomination and election of officers and executive committee for the 1954-55 season were held. A gift was presented to Otto Zmeskal, retiring chairman, in appreciation of his successful year of service to the Chicago Chapter.—**Reported by A. F. Ernster for the Chicago Chapter.**

New York Panel of Experts Presents Welding Discussion

A panel discussion on "Welding" was presented before the New York Chapter by a group of welding engineers and physical metallurgists. T. N. Armstrong, moderator, presented a group of slides for discussion by the panel, which consisted of A. W. Steinberger, Curtiss-Wright Corp., David Swan, Union Carbide and Carbon Corp. and Helmut Thielsch, Grinnel Co., welding engineers, and E. S. Machlin, Columbia University, H. Margolin, New York University and L. Seigle, Sylvania Electric Products Corp., physical metallurgists.

The slides covered such subjects as weld cracking, graphitization, hydrogen embrittlement and brazing. Robert H. Aborn, U. S. Steel Corp., added to the discussion of graphitization, discussing extensively the failure of graphitization of a steel pipeline operating at an elevated temperature. Mr. Aborn pointed out that the engineers had solved the problem by adding more chromium to the steel, thus increasing the time length for graphitization to a point beyond the useful life of the pipeline.

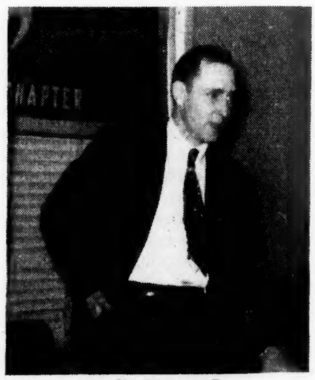
Mr. Steinberger discussed the effect of hydrogen in steel, and pointed out that cracking could occur in steels containing hydrogen even when the hardness was low. Hydrogen embrittlement is eliminated by high-temperature annealing or by not using hydrogen during welding.

The meeting concluded with a presentation by Prof. Machlin of the effects of small amounts of impurities on friction coefficients. Oxygen contents up to 0.8%, for example, considerably reduced the coefficient of friction of titanium on titanium. **—Reported by Harold Margolin for the New York Chapter.**

Joining Metals by Brazing Is Subject at St. Louis

Speaker: A. Stanley Cross, Jr.
American Platinum Works

"Joining of Metals by Brazing" was the subject discussed by A. Stanley Cross, Jr., American Platinum Works, before a meeting of the St. Louis Chapter.



A. S. Cross, Jr.

Mr. Cross described the advantages and disadvantages and proper use of brazing, particularly with silver alloys. He also pointed out the relationship of brazing to other methods of metal joining.—**Reported by Frank Delaplane for St. Louis.**

Demonstrates How to Measure Residual Stress At Canton-Massillon

Speaker: R. L. Mattson

General Motors Corp.

The Canton-Massillon Chapter heard R. L. Mattson, assistant head of the engineering mechanics department, Research Laboratories Division, General Motors Corp., speak on "Residual Stresses—Measurement and Application". Mr. Mattson discussed the importance of residual stresses and how they can be effectively applied to increase the life of component parts of machinery. He prefaced his talk with a demonstration of a clever model designed to show what residual stresses are and the importance of these forces.

A number of slides were also presented which showed a definite correlation between fatigue life of leaf springs and residual stresses as introduced by shot peening. As the residual compressive stresses increased, a substantial increase in fatigue life of the springs was also realized.

Mr. Mattson described the type of residual stresses that can be introduced by various processing operations, such as heat treatment, case hardening, machining, grinding, cold working and straightening. Stresses set up by any one of these operations can generally be traced to one or more of such factors as phase transformation, cold plastic flow, warpage, temperature differential and altered chemistry.

Two techniques for measuring residual stresses were described, namely, the split deflection technique and the dissection technique which is used by General Motors Corp. Both techniques have their limitations, and Mr. Mattson pointed out the great need for a simple test to measure residual stresses.—**Reported by G. P. Michalos for the Canton-Massillon Chapter.**

Discusses Shell Molding At Meeting in San Diego

Speaker: Walter H. Dunn

Solar Aircraft Co.

The San Diego Chapter heard Walter H. Dunn, foundry superintendent of the Solar Aircraft Co., speak on "Shell Molding" at a recent meeting.

Mr. Dunn gave the history of casting of metal and pointed out that while the foundry has not changed in over 5000 years, much science has been added. He stressed the point that shell molding is not intended to replace the conventional sand molding methods, but to complement them.

The chief advantages of shell molding over conventional sand molding are: The strength and lightness of the molding, greater casting tolerances, thinner walls are possible in castings, as-cast surfaces require less than 0.005 in. metal to be removed for polishing operations, less hydrogen absorption into the casting that would produce stresses and strains, due to the imperviousness of the shell mold to water, and less skilled labor is needed in shell molding.

The disadvantages include: High tooling temperature is needed to form shell molds (500° F.); pattern changes are expensive to make; tools necessary for shell molding are delicate and expensive; a small amount of equipment for shell molding is available in the U. S.; personnel in foundry work must be re-educated to shell molding techniques; and the fundamental laws of good casting must still be followed.

Shell molding, as used by the Solar Aircraft Co., finds its main application in stainless steel castings. Also, they have successfully cast aluminum, brass, bronze, magnesium and some super alloys.—**Reported by Edward M. Duke for San Diego.**

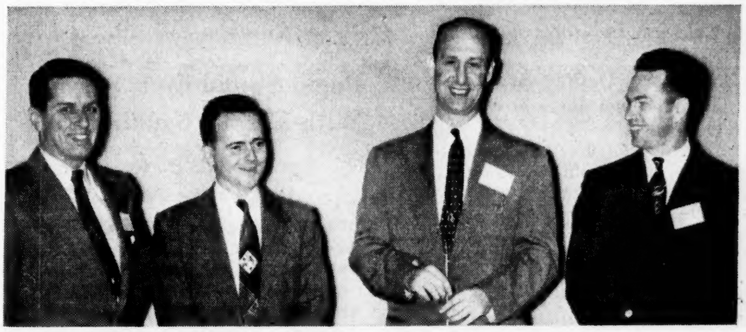
Translations List Available

A list of translations in the Special Libraries Association Translations Pool is now available for distribution. Requests for copies, accompanied by 30c to cover the cost of postage, should be addressed to:

S.L.A. Translations Pool
John Crerar Library
86 East Randolph St.
Chicago 1, Ill.

The 73-page list comprises 1100 translations, principally of scientific and technical information, which were in the Pool as of Oct. 1, 1953.

Give High-Temperature Metallurgy Series



Shown During One of Oak Ridge's Recent Series on "High-Temperature Metallurgy" Are, From Left: Francois Kertesz, Oak Ridge National Laboratory; J. R. Johnson, Lecturer, Oak Ridge National Laboratory; N. J. Grant, Lecturer, Massachusetts Institute of Technology; and Anton deS. Brasunas, University of Tennessee, Chapter Educational Committee

"High-Temperature Metallurgy" was the topic selected by the Oak Ridge Chapter for their second educational lecture series. N. J. Grant of Massachusetts Institute of Technology's metallurgy department lectured on two of the three evenings. His opening talk was concerned with a general discussion of the demands made on metals for elevated temperature applications. Although chemical properties, especially relative to corrosion, are important and physical properties, such as unique electrical and thermal conductivities are sometimes essential, Dr. Grant emphasized the mechanical properties that are currently being sought.

Deformation at elevated temperatures takes many forms, certain ones being fundamentally different and competitive. As the late H. W. Gillett also frequently stated, the representation of high-temperature creep by relatively simple mathematical formulas is an oversimplification of the high-temperature deformation processes in pure metals and commercial alloys. Dr. Grant illustrated slip, kinking, grain boundary sliding, fold formation and grain boundary migration, and also discussed polygonization, progressive bending, deformation bands and the concept of equicohesive temperature.

The second lecture was primarily concerned with the graphical representation of micro and macro-creep and their relationships to the relatively well-known time-elongation curves. The summation of large amounts of test data on graphs was illustrated and the pitfalls in indiscriminate extrapolations emphasized.

James Johnson, ceramist at Oak Ridge National Laboratory, presented the third lecture on "Cermets". He described how the manufacturing techniques have developed. The properties of these metal-ceramic composites were indicated to be unique and might be attributed to the "wetting" of the ceramic by the metal-bonding material in a manner similar to cemented tungsten carbide bodies. The audience was amused by Dr. Johnson's reference to the fact that some ceramists consider procelainized steel bathtubs as cermet products. Discussion periods followed each lecture.—**Reported by Anton deS. Brasunas for the Oak Ridge Chapter.**

Roberts Talks on Toolsteels in Canada

A.S.M. Vice-President George Roberts Spoke on "Toolsteels" at a Meeting in Western Ontario. Shown are, from left: R. E. Barton, Canadian Mines Equipment Ltd., Chapter treasurer; Howard Wright, Vanadium-Alloys Steel, Canada, Ltd., technical chairman; Dr. Roberts; P. E. Banwell, Walker Metal Products Ltd., chairman; and T. J. Carson, executive committee member

Speaker: George A. Roberts

Vanadium-Alloys Steel Co.

The Western Ontario Chapter heard National Vice-President George Roberts, Vanadium-Alloys Steel Co., speak on "Toolsteels" recently.

Dr. Roberts stated that there are over 100 different toolsteel grades which have been developed for specific purposes but that it is not necessary to stock all of these grades. Toolsteels can be classified into seven groups: Water hardening, shock resisting, oil hardening, air hardening, high carbon-high chromium, hot working and high speed steels. Each group is subdivided into steels with different analyses but essentially similar physical characteristics. From the 26 steels falling into these seven groups, the average tool and die shop could stock only 9 or 10 steels and his requirements would be adequately covered. The matrix of all toolsteels is essentially the same and diverse properties are obtained from the carbide structure.

Slides illustrating hot hardness, toughness and wear resistance of the various types of high speed steels were shown and discussed. Dr. Roberts described the effects of quenching, tempering time and temperature. The wear resistance and hot hardness of the various carbide compounds found in high speed steels were discussed and the superior properties found in the vanadium carbides fully illustrated. Methods for determining bend tests, ductility and grain size were also described, as well as heat treating precautions to minimize fish scale and decarburization.

During the afternoon preceding the meeting, members of the Chapter visited the modern new plant of Vanadium-Alloys Steel, Canada, Ltd., and saw several of the new units in operation manufacturing toolsteels.—**Reported by H. J. Wright for Western Ontario.**

Puget Sound Ends Season With Fusion Welding Talk

Speaker: C. B. Robinson

Air Reduction Pacific Co.

C. B. Robinson, supervisor of process promotion on the Pacific Coast for the Air Reduction Pacific Co., reviewed the "Development of the Aircomatic Welding Process", at a meeting in Puget Sound.

This process which was introduced to industry in 1948 after extensive study, uses a continuous, consumable electrode surrounded by an inert-gas shield, allows fluxless arc welding, automatically controlled, and proceeding at high speeds. Mr. Robinson presented motion pictures to illustrate details of the process and show its extreme versatility. Various inert gases are employed, primarily helium and argon, and combinations of these gases, and, in some cases, oxygen. The use of helium has certain advantages, such as better wettability, and requires less edge preparation. It is primarily used for material gages of $\frac{3}{16}$ in. and over.

Argon produces a cooler shield and affords better control of burn-through in thinner gages. Although welding of aluminum alloys in gages below $\frac{1}{8}$ in. is not satisfactory, certain steel set-ups have been worked out using thinner gages.

Helium-argon has been used very successfully as a shield for welding copper up to $1\frac{1}{2}$ in. thick with no preheat. This is done in several passes with no interpass cleaning. Production rates and design possibilities in the field of copper fabrication have been greatly improved by this process.—**Reported by Eugene E. Bauer for Puget Sound Chapter.**

Illustrates Effective Heat Treating Practices

Speaker: A. T. Ridinger

Metallurgical, Inc.

The Kansas City Chapter heard Albert T. Ridinger, president of Metallurgical, Inc., speak on "Commercial Heat Treating Practice".

Mr. Ridinger's talk was divided roughly into three parts. The first part, which he illustrated with color slides, dealt with furnace copper brazing of various parts. He emphasized the economies that may be effected by using stampings joined by copper brazing as a substitute for castings or expensive machined parts.

Mr. Ridinger then covered the heat treating of 75 SO-clad aluminum. His company's experience indicates that it is very important to soften all water used in the quench to a grain hardness of 1 to 0 in order to achieve 106-110 Rockwell E and tensile of 82,000 psi. It also finds that the "hardness is set" in the first 10 min. of aging and that temperature is critical at this time.

The third part of Mr. Ridinger's talk was about his new plant in Minneapolis, which he illustrated with three-dimension slides.—**Reported by Bob Scrom, Jr., for the Kansas City Chapter.**

Gives Factors in Choice Of Alloys for High-Temperature Service

Speaker: E. N. Skinner

International Nickel Co.

E. N. Skinner, International Nickel Co. Inc., discussed "Factors Governing the Choice of Alloys for High-Temperature Service" in St. Louis.

Dr. Skinner discussed the selection of alloys for high-temperature

E. N. Skinner

service, comparing the materials on the basis of their high-temperature strength properties and corrosion resistance, with the greatest emphasis upon the latter. He also discussed the behavior of various alloys under conditions involving oxidation, carburization, nitriding, sulphidation, or attack by molten metals and fused salts.—**Reported by Frank Delaplane for St. Louis Chapter.**

THIRTY YEARS AGO

Personal items in 1923 included the announcement that BRADLEY STOUGHTON, "until recently secretary of the A. I. M. E. and a prominent New York consulting engineer", was appointed professor of metallurgy at Lehigh University (later becoming dean of engineering, now retired and an A.S.M. past president).

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A report of the activities of the subcommittee on pyrometry is also published in the 1923 volume of the Society's *Transactions*. Chairman of this subcommittee was J. H. G. WILLIAMS, then with Billings & Spencer Co., Hartford (now metallurgist for Springfield Armory).

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New national officers of the A. S. S. T. elected in the fall of 1923 were GEORGE K. BURGESS, director, Bureau of Standards, for president; W. S. BIDLE, president, W. S. Bidle Co., for first vice-president; and ROBERT M. BIRD, engineer of tests, Bethlehem Steel Co., second vice-president (all three now deceased). ZAY JEFFRIES, then with the research bureau of Aluminum Co. of America (now G.E.'s retired vice-president) was elected treasurer, and, as everybody knows, W. H. EISENMAN was reelected as secretary.

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Reporting on the 5th Annual Convention and Exposition of the American Society for Steel Treating, the November 1923 issue of *Transactions* quotes an editorial from *Iron Age:* "At its 5th annual gathering in Pittsburgh, Oct. 8 to 12, this Society successfully put through a technical program and a steel exposition which would reflect credit on a much older body. In the quality of the papers presented, in the scope of the products exhibited, and in attendance, the meeting was a surprise to some of the most ardent steel treaters. A feature of the convention from the technical standpoint was the high standard set by the program as a whole. . . . The exhibition, commercially, and in every other way, was a success . . ."

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During the business meeting of the Society at the National Convention of 1923, a motion was made that the name of the "Standards Committee" be changed to "Recommended Practice Committee". Under this name the committee functioned with fruitful industry until 1935 when it became today's Metals Handbook Committee.

Presents Sauveur Lecture on Welding

J. C. Hodge, Vice-President, Wellman Engineering Co., Who Presented the Annual Sauveur Memorial Lecture Before the Boston Chapter, Accepts a Plaque Commemorating the Event. Shown are, from left: H. H. Lester, Watertown Arsenal; Dr. Hodge; Morris Cohen, Massachusetts Institute of Technology; and Albert Sauveur Eaton, grandson of Professor Albert Sauveur

Speaker: J. C. Hodge
Wellman Engineering Co.

J. C. Hodge, vice-president, Wellman Engineering Co., presented the Boston Chapter's annual Sauveur Memorial Lecture. The subject of his lecture was "Some Metallurgical Observations on the Welding Process". This is a field in which Prof. Sauveur had no activity as evidenced by publications, but he did show great interest in the metallurgical phenomena accompanying the welding process during his years of association with Dr. Hodge.

Dr. Hodge traced the development of fusion welding from about 1925 to the present time with particular reference to the field of welded boilers and pressure vessels in which he has had wide experience. The shrinkage of hot driven rivets limited pressure vessel thicknesses at that time to about 2¾ in. The advent of welding in 1930 brought about remarkable advances in pressure vessel design since the large diameter, high-pressure vessels of the present day are permissible only through welding. This advance in welding technique was accompanied and aided by the development of industrial radiographic equipment and techniques. It was shown that the development of welding in this and other fields resulted in a 500-fold increase in annual electrode consumption over the period 1927 to 1952.

Dr. Hodge discussed the metallurgical conditions associated with metal-arc welding, pointing out that the mixture of superheated molten metal from the arc with the base metal and the thermal gradient established between the line of fusion and the temperature of the parent metal could produce a wide variety of metallurgical structures affecting the weldability of the material. It was illustrated that higher strengths in welded structures are better attained through the addition of manganese rather than of carbon since better combination of yield strength and ductility is obtained.

Concerning residual stresses it was pointed out that brittle failures only occur when high residual stress exists in combination with base material of low notch toughness. Recent advances in improvement of notch toughness of structural materials have contributed greatly to the safety of welded structures.

Dr. Hodge illustrated time-strain diagrams which showed that some materals tested in the 300-400° C. temperature range exhibited extremely irregular plastic deformation at loads above the yield point. The sudden dropping of load and immediate regaining of strength is thought to be due to precipitation of nitrides or oxides and the immediate aging of the precipitate in the blue heat temperature range. This test was recommended as a research tool and has been used in the case of weld metals to demonstrate the superiority of low-hydrogen and submerged-arc weld metals.—**Reported by R. A. Pomfret for Boston.**

Ⓢ publishes the *Metals Handbook*, known as the Bible of the metals industry, the present edition costing $250,000. It is estimated that if the volunteer services of the 2016 members contributing to the book had been paid at a reasonable rate, the cost would have been in excess of $5,000,000.

Rhode Island Panel on Heat Treating

Shown at a Meeting of the Rhode Island Chapter During Which a Panel Discussed "Heat Treating Methods" Are, From Left: K. H. Mairs, Chapter Chairman; Panel Members G. J. Parker, Herman Koester, John B. Carey and Gordon Wheeler; and L. E. Wagner, technical chairman of the meeting

A symposium on "Heat Treating Methods" was presented by a four-member panel in Rhode Island recently. Methods covered in the discussion included induction heating, salt bath, gas and electric heating.

G. J. Parker, of G. J. Parker, Inc., discussed induction heating. The induction method gives uniformity of heating with good repetition. Apparently there is no limit to the temperature which can be obtained and small areas can be locally heated quite easily. The method is expensive, but, for certain types of work, its advantages warrant its expense.

John B. Carey, A. F. Holden Co., discussed the merits of the salt bath method. A rapid uniform heat can be easily obtained. Use of the salt bath eliminates atmosphere contact. Salts are now available which are suitable for the direct quenching of cyanide treated parts.

Gas heating was discussed by Herman Koester of W. Wirt Young & Assoc. Gas heating is the most widely used method in the general heat treating field. However, each heat treating job is different and must be done by the most economical method, and gas is usually the most economical fuel to use, although it is not efficient at the very high temperatures.

Gordon Wheeler, Sentry Co., discussed electric heating. Electric furnaces are both dependable and efficient. They have good flexibility and can be accurately regulated, and are very good at the higher temperatures. Electric furnaces are safe, have long life and are easily moved if necessary.

An active question period followed these short discussions. Members and speakers had many interesting "bouts" with some of the questions. **—Reported by Warren M. Hagist for Rhode Island.**

Discusses Role of Atomic Power Plant Developments To Supply Electric Power

Speaker: R. A. Bowman

Bechtol Corp.

R. A. Bowman, manager of engineering, Power Division, Bechtol Corp., presented a lecture on the "Development of Nuclear Power Plants" at a meeting in Oregon.

There is at present a great interest in development of nuclear power plants due to the need for more electrical power. Whereas capacity in 1910 was 10,000,000 kilowatts, it has increased to more than 100,000,000 kilowatts at the present time, and if the same progress continues, 1970 will see a requirement of 200,000,000 kilowatts. With little future hydroelectric power development available and a need to conserve natural resources, plans are being formulated to take advantage of nuclear fission. One pound of uranium is equal to 1500 tons of coal with at least 95% being in the form of kinetic or heat energy. In general, heat of fission goes through a heat exchanger creating steam which motivates turbines. The average layman considers this type of power plant hazardous, but, actually, the only thing that could happen if the coolant failed to function properly would be that the power plant would melt without a chance of the type explosion we so often associate with nuclear fission occurring.

Development of the nuclear power plant is divided into the following phases:

Laboratory experiments, etc.—mostly completed; military applications phase, example of which is the atomic-powered submarine; subsidized prototype power plant, constructed by either government or private industry, which will be patterned after the atomic submarine power plant; actual construction of an atomic power plant in an area where no other generating equipment is available; and construction of an economical power plant.

The speaker estimated that it will take at least 10 to 15 years to build the first economical nuclear power plant—**Reported by J. E. Gustafson for the Oregon Chapter.**

Dye Penetrant Inspection Methods Topic at Meeting

Speaker: W. F. Voorhes

Turco Products, Inc.

W. Frank Voorhes, technical representative and process engineer of Turco Products, Inc., addressed the Jacksonville Chapter on Turco's Dy-Chek and Check-Spek, materials improved by the company for locating surface flaws in metals.

W. F. Voorhes

Turco's Dy-Chek and Check-Spek are dye penetrant methods, fast gaining prominence, especially in the metalworking industry. They are obtainable in portable kits for use in the field, shop or manufacturing plants. Dy - Chek and Check - Spek are being used extensively in the aircraft industry and foundries for detecting casting surface defects, welding and forming defects and heat treat cracks. Demonstrations of the products illustrated the simplicity of the process.

With Dy-Chek, the simple steps are the cleaning of the surface to be checked, application of the Dy-Chek penetrant, wiping away any excess with a special remover, and finally, use of Dy-Chek developer, which reveals any surface flaws that exist in the material regardless of size or shape. A motion picture showing the application of both Dy-Chek and Check-Spek in the aircraft industry was shown by the speaker.—**Reported by Walter S. Morris for Jacksonville.**

Schedule Nuclear Congress

The American Institute of Chemical Engineers has scheduled an International Congress on "Nuclear Engineering" from June 20 through 24, 1954, to be held at the University of Michigan, Horace H. Rackham School of Graduate Studies, Ann Arbor. Some 90 papers on various phases of nuclear engineering, including research, technology, properties, economics and applications, will be given in a series of concurrent sessions. An "Atoms for Peace" Exposition will be held in conjunction with the Congress during which educational exhibits will be presented.

Why Metals Fail Topic at Tri-Chapter Meeting

Present at the 16th Annual Tri-Chapter Meeting of the Columbus, Dayton and Cincinnati Chapters A.S.M., Which Featured Lectures on "Why Metals Fail" Were, First Row, From Left: Jacob G. Gantner, Dayton Chairman; W. D. Whalen, Cincinnati Chairman; W. H. Eisenman, National Secretary; Arthur B. Westerman, Columbus Chairman; and Earl J. Bleakley, Dayton Executive Committee. Second row: Albert J. Pfetzing, Cincinnati treasurer; John J. B. Rutherford, chief metallurgist, Babcock & Wilcox Co., guest speaker; Frank H. Beck, Dayton executive committee; Gregory F. Bauman, Cincinnati executive committee; Irvin H. Schaible, Dayton vice-chairman; R. Ernest Christin, Columbus secretary; and William E. Bryden, Cincinnati executive committee. Third row: Paul Bernert, Cincinnati executive committee; G. Wesley Fischer, Cincinnati secretary; Albert M. Hall, Columbus executive committee; and Dewitt Gerstle, Dayton executive committee. Last row: William J. Henry, Cincinnati past chairman; Russell Hoffman, Cincinnati executive committee; David C. Hechard, Dayton executive committee; C. Ted Haller, Cincinnati executive committee; Glenn R. Stockmeier, Dayton executive committee; and Miller C. LaBau, Cincinnati executive committee

Texas Hears Powder Metallurgy Talk

D. B. Martin (Center), Amplex Division, Chrysler Corp., Talked on "Powder Metallurgy" in Texas Recently. He is shown with Bob Oakley, Jr., (left), Steel Machine Tool Sales, and W. Mack Crook, Chapter chairman

Speaker: D. B. Martin

Chrysler Corp.

D. B. Martin, vice-president of the Amplex Division, Chrysler Corp., spoke on "Powder Metallurgy" before a meeting of the Texas Chapter.

The process of making powder metal bearings and other parts was briefly discussed. Powder metal parts which are currently being made range in size from 1000 pieces per lb. to 250 lb. each. Pressures of 15 to 60 tons per sq. in. are used during the briquetting process of the green compacts. The compacts are then given a sintering treatment and finally sized or coined to the required dimensions and tolerances. A variety of metal powder compositions may be used for different products and parts.

Powder metal products are now being produced with steel powders which may be heat treated to obtain 100,000 lb. per sq. in. tensile strength. Porous bearings are impregnated with oil to produce a self-lubricated bearing. A close tolerance may be held with powder metal bearings, and it is possible to fit Oilite bearings to a ½-in. diam. shaft with a clearance of 0.0002 in. and to a 1¾-in. shaft with a clearance of 0.00052 in.

Porous filters are being manufactured with powder metals and with very accurately controlled particle sizes and controlled porosity from 10 to 80%. The filters are made in a range of sizes and metal compositions for special purposes. A sound film strip was shown by the speaker to illustrate various products made from powder metals.—**Reported by C. L. Horn for Texas.**

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio

Stewart J. Stockett, Technical Abstracter

Assisted by Fred Body, Mitchell Baker, Mildred Landon and Members of the Translation Group

A General Metallurgical

132-A. Effective Use of Materials. F. Nixon. *Aircraft Production,* v. 16, Apr. 1954, p. 157-164.

Viewpoints, processes and other factors influencing economics of production. Photographs, chart, table. (A4, T24)

133-A. Gas Turbines for the Steel Industry. George H. Krapf. *Blast Furnace and Steel Plant,* v. 42, Apr. 1954, p. 444-447, 450.

New era gives promise of lower operating and investment costs, lower area and water requirements and simplicity of operation. Diagrams, graph. (A5, D general)

134-A. Briquetting Cast-Iron Swarf for Re-Melting. *Engineering,* v. 177, Mar. 26, 1954, p. 414.

A 400-ton automatic hydraulic press capable of converting cast iron swarf into high-density briquettes, suitable for direct remelting, at a rapid and constant rate. Photograph. (A8, CI)

135-A. Metalworking's Future Markets. *Iron Age,* v. 173, Apr. 8, 1954, p. M1-M32.

Includes "What the Future Holds for Business", Arno H. Johnson; "New Customers: Five Every Minute", R. W. Burgess; "Copper: Many Factors Will Affect Its Future", Kemp G. Fuller; "Steel: What Will Demand, Output Be During 1955-1959?", B. E. Estes; "Titanium: 4-Year Old Industry Sees Problems, Bright Future", C. I. Bradford and D. W. Kaufmann; "Aluminum: What Will We Do With It All?", D. P. Reynolds; "Magnesium: Supply Unlimited, Growth Just Starting", D. T. Surprenant; and "How the Government Can Help You Find Markets", H. W. Ketchum. (A4, Cu, ST, Ti, Al, Mg)

136-A. Directory of Degree Programs in Metallurgy. A. Bornemann, compiler. *Metal Progress,* v. 65, Mar. 1954, p. 96B.

American universities offering curricula in metallurgy. (A3)

137-A. Competition Between Aluminium and Steel. *Mining Journal,* v. 242, Mar. 26, 1954, p. 365-366.

Production and costs. Indicates industries in which aluminum finds an application. From viewpoint of total consumption, competition between iron and steel and aluminum is still, and will remain, on a small scale. Table.

(A4, T general, Al, ST, CI)

138-A. Modern Iron and Steel Works. H. Boddington. *South African Mining and Engineering Journal,* v. 65, pt. 1, Mar. 6, 1954, p. 5, 7, 9.

Architect's approach to design and layout. (A5, D general, Fe, ST)

139-A. United States Steel in the West. John L. Young and W. F. Pruden. *Iron and Steel Engineer,* v. 31, Apr. 1954, p. 55-64.

General review of progress made in the past 23 years. Photographs, graph, map. (A4, D general, ST)

140-A. Foundation Design for Iron and Steel Plants. George S. Richardson. *Iron and Steel Engineer,* v. 31, Apr. 1954, p. 73-76; disc., p. 76-77.

Determination of safe soil-bearing loads and safe pile loading. Applicable to machinery or mill building foundation design. Graphs. (A5, ST)

141-A. Water Supply for Steel Plants. Ross Nebolsine. *Iron and Steel Engineer,* v. 31, Apr. 1954, p. 78-88; disc., p. 88.

Water demands of integrated steel plants, principal features of water systems used, methods of utilization of available supply, quality of water required and plant distribution systems. Tables, chart, diagrams. (A5, ST)

142-A. How a Critical Shortage of Fuel Engineers for Open Hearth Operations Was Solved. William Whigham, Jr. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 21-24; disc., p. 31-32.

Outlines course of study developed by U.S. Steel Corp. and Carnegie Tech. (A3, D2)

143-A. Training Open Hearth Personnel in New Shops. H. L. Tear. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 24-28; disc., p. 31-32.

Outlines program used at J & L's No. 4 shop. Table, graphs. (A3, D2)

144-A. Training of Open Hearth Personnel, Republic Steel Corporation, Cleveland. R. P. Carpenter. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 28-29; disc., p. 31-32.

Program and its results. (A3, D2)

145-A. Training Open Hearth Personnel at Fairless Works. H. A. Parker. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 30-31; disc., p. 31-32.

Background of personnel. Outline of training program. (A3, D2)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

146-A. Training Open Hearth Personnel at Ohio Works. E. L. Wentz. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 33-34; disc., p. 39-40.

Program for initiating new procedure in old plant. (A3, D2)

147-A. Training Personnel at No. 2 and No. 4 Open Hearths, Bethlehem Steel Company. M. K. Morris. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 35-37; disc., p. 39-40.

Training of new employees. Refresher instruction as a permanent program. (A3, D2)

148-A. Training Open Hearth Personnel at Lukens Steel Company. C. H. Alexander. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 38-39; disc., p. 39-40.

Separate programs for supervisors and furnace crews. (A3, D2)

149-A. New Materials Developments. Julius J. Harwood. *Research Reviews, Office of Naval Research,* Mar. 1954, p. 7-14.

Directions in which materials research and development programs are heading; recent accomplishments; potential fields of applications. Table, photographs. (A general)

150-A. Waste Handling Is Turned to Profits. *Steel,* v. 134, Apr. 26, 1954, p. 116-117.

Capital expenditure of $79,000 for chip handling equipment and oil reclamation system trebled gross savings in 20 months. Photographs. (A8, G17)

151-A. Plant Nutrients From Slag. Furnace Slag as a Source of Plant Nutrients and Its Liming Effectiveness Relative to Limestone. P. P. Chichilo, W. H. Armiger, A. W. Specht and C. W. Whittaker. *Journal of Agricultural and Food Chemistry,* v. 2, Apr. 28, 1954, p. 458-462.

Study of absorption by crops of some elements contained in blast furnace slag used for soil liming or supplied by soil or added fertilizer. Tables. 12 ref. (A8, D1)

152-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 21, Apr. 1954, p. 173-179.

From "magnet alloys" to "mantle". Tables, graphs, photograph. (To be continued.) (A10)

153-A. (Book.) Elements of Foundry Costing. Pt. IV. Fettling and Routine Inspection. H. P. Court and W. E. Harrison. Council of Ironfoundry Associations, 14, Pall Mall, London, S.W. 1.

Analysis of wages, methods of recording fettling-shop output, inspection, overheads, and estimating. (A6, E general)

154-A. (Book.) **High Vacuum in Industry.** Marvin Grossman. 64 p. 1953. Harvard Graduate School of Business Administration, Cambridge, Mass.

Comprehensive survey of future of industrial vacuum technique in America. Includes metallurgical applications, refining, purification, melting, casting, heat treating, and coating of metals with a heat-resisting coating of another metal. (A general, C25, D8, J general, L25)

155-A. (Book.) **Kempe's Engineer's Year-Book.** 59th ed. (2 vols.) 1954. Morgan Brothers Ltd., 28 Essex St., Strand, London W.C. 2. 75s.

Reference book on technical and scientific data in all fields of engineering. (A general)

156-A. (Book.) **Workshop Costs and Costing.** P. S. Houghton. Chapman and Hall, Ltd., 37 Essex St., London, W. C. 2, England. 35s.

Advantages of costing systems in general for new businesses, foundries, etc., treated from the viewpoint of an engineer. (A4, A6)

B
Raw Materials and Ore Preparation

146-B. The Processing Possibilities of Ultrasonics. Oskar Mattiat. *Acoustical Society of America, Journal,* v. 26, Mar. 1954, p. 241-243.

Use of ultrasonic waves in extraction, dispersion, emulsification, flotation ore dressing, soldering, drilling and cleaning. 12 ref. (B general, L12, K7, G17)

147-B. Recovery of Uranium From Canadian Ores. A. Thunaes. *Canadian Mining and Metallurgical Bulletin,* v. 47, no. 503, Mar. 1954, p. 128-131; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 57, 1954, p. 60-63.

Extraction, treatment methods and influence of mineralogy. Table. (B general, U)

148-B. Fine Grinding With Screened Ore At Lake Shore Mines. Bunting S. Crocker. *Canadian Mining and Metallurgical Bulletin,* v. 47, no. 503, Mar. 1954, p. 183-196; *Canadian Institute of Mining and Metallurgy,* v. 57, 1954, p. 115-128.

Development of process, equipment, operating procedures and testing methods. Photographs, diagrams, tables. (B13)

149-B. Progress in Sintering. Quality of Iron Ore Sinter as Related to Moisture and Coke Content. H. A. Morrissey and R. E. Powers. *Journal of Metals,* v. 6, Apr. 1954, p. 447-449.

Abstracted from paper presented at AIME Blast Furnace, Coke Oven and Raw Materials Committee Meeting, Chicago, Apr. 1954. Clarifies problems faced by sinter plant operator in attempts to produce a strong, dense, readily reducible blast furnace material. Diagram, tables. (B16, Fe)

150-B. Some Engineering Features in Modern Ore Dressing and Smelting Practice. C. C. Downie. *Mining Journal,* v. 242, Mar. 19, 1954, p. 329-330.

Dimensions and capacities of motors and concentrating, briquetting, and drying equipment. 8 ref. (B14, B17)

151-B. Homestake Rebuilds South Mill to Save Manpower and Horsepower. Nathaniel Herz. *Mining World,* v. 16, Apr. 1954, p. 40-43, 63.

Development of ore grinding by the Homestake Mining Co., Lead, S. D., from 1878 to present. Photographs. (B13, Au)

152-B. The Current Status of Cyclones as a New Classification Tool. A. J. Fischer and R. D. Forger. *Mining World,* v. 16, Apr. 1954, p. 44-47, 65.

Design and operational variables and classification cost comparisons. Photographs, tables. (B14)

153-B. (French.) **The Use of Granulated Ferromanganese.** J. G. Platon. *Revue de métallurgie,* v. 51, no. 2, Feb. 1954, p. 108.

Use in steelworks shows irregular results due to insufficient precautions to avoid loss of ferromanganese in slag. (B22, D general, ST)

154-B. (German.) **Metallurgical Problems of Alumina Production.** Hans Ginsberg. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 7, no. 3, Mar. 1954, p. 93-98; disc., p. 98-99.

Problems of extracting by Bayer process. Effectiveness of 15 substances as inoculants. Metallographic and X-ray structure of bauxites. Tables, graphs, photographs, micrographs. 2 ref. (B14, Al)

155-B. Ore Dressing Research in India—1953. *Chemical & Process Engineering,* v. 35, Apr. 1954, p. 113-114.

Equipment and techniques in present use. Tables. 11 ref. (B13, B14)

156-B. How to Control Heat for Calciners. Wolf G. Bauer. *Chemical Engineering,* v. 61, May 1954, p. 193-200.

Practical considerations for effective utilization of heat for calcining minerals. Photographs, diagrams. (B15)

157-B. Preparation of Ores. III. Theory of Sintering and Testing of Materials. J. M. McLeod. *Iron & Steel,* v. 27, Apr. 1954, p. 145-151.

Critical review of published literature. 61 ref. (B16)

158-B. Aluminum-Bauxite Reserves and Production. *Light Metal Age,* v. 12, Apr. 1954, p. 20-21, 23, 31.

World statistics and developments. (B10, A4, Al)

159-B. Solid State Bonding in Iron Ore Pellets. Strathmore R. B. Cooke and Robert E. Brandt. *Mining Engineering,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 199, Apr. 1954, p. 411-415.

Study of solid state reaction responsible for development of hard shell in conventionally fired magnetite pellets and high strength and uniform internal structure in laboratory pellets pre-oxidized before final firing. Photographs, micrographs, table, graph. 4 ref. (B16, Fe)

160-B. Flotation of Oxidized Zinc Ores. M. Rey, G. Sitia, P. Raffinot and V. Formanek. *Mining Engineering,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 199, Apr. 1954, p. 416-420.

Fatty amines efficient for partially oxidized sulfide ores. Tables, graphs, diagram. 12 ref. (B14, Zn)

161-B. The Behaviour of Sulphur in Silicate and Aluminate Melts. C. J. B. Fincham and F. D. Richardson. *Royal Society, Proceedings,* v. 233, ser. A, Apr. 7, 1954, p. 40-62.

Manner in which sulfur atoms from gas displace oxygen atoms from silicates reveals a great deal of nature of melts. Equilibrium is of metallurgical importance, as it is basis of desulphurization by slags and plays a role in other slag processes involving sulfides. Tables, diagrams, graphs. 38 ref. (B21)

162-B. Raw Materials for Aluminum Production. D. D. Blue. *U. S. Bureau of Mines. Information Circular* 7675, Mar. 1954, 11 p.

Alumina extraction and reduction processes. Tables. (B general, Al)

163-B. The Influence of Temperature on Efficiency of Grinding. L. E. Djingheuzian. *Canadian Mining and Metallurgical Bulletin,* v. 47, no. 504, Apr. 1954, p. 251-259; disc., p. 259-262; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 57, 1954, p. 157-168.

Results of studies on solitic limestone, copper-nickel ore, silver-lead-zinc ore and quartz. Tables, graphs. 7 ref. (B13, Cu, Ni, Ag, Pb, Zn)

164-B. (Book—French.) **Metallurgy. Working of Metals. (Metallurgie. Elaboration des Metaux.)** v. II. 2nd Ed. C. Chaussin and G. Hilly. 202 p. 1954. Dunod, 92 rue Bonaparte, Paris 6, France. 880 fr.

Basic processes in extraction metallurgy including crushing, magnetic and flotation concentration; blast-furnace theory and practice; manufacture of steel and ferro-alloys; and nonferrous and powder metallurgy. (B general, C general, D general, H general)

C
Nonferrous Extraction and Refining

100-C. Temperature Regulator Used in Producing Germanium Crystals. G. J. Lehmann and C. A. Meuleau. *Electrical Communication,* v. 31, Mar. 1954, p. 19-26.

Construction of high-frequency furnace and an electronic temperature regulator that stabilizes at 930 $\pm$ 0.16° C. Photographs, diagrams. 7 ref. (C21, S16, Ge)

101-C. Techniques for the Investigation of Thermal Conditions in Continuous Casting. D. M. Lewis. *Institute of Metals, Journal,* v. 82, Apr. 1954, p. 395-413 + 3 plates.

Apparatus and techniques for aluminum alloys. Photograph, radiograph, graphs, diagrams. 45 ref. (C5, Al)

102-C. The Use of Autoradiography for Finding the Solidification Boundary in Continuously Cast Aluminium. J. L. Putman. *Institute of Metals, Journal,* v. 82, Apr. 1954, p. 414-416 + 1 plate.

Experimental work to determine whether Au^{198} and Cu^{64} are suitable for use as radioactive tracers for delineation of liquid-solid interface in continuously cast aluminum billets. Radiographs. (C5, M23, Al)

103-C. Germanium Diodes From Spherical Pellets. W. C. Dunlap, Jr. *Journal of Applied Physics,* v. 25, Apr. 1954, p. 448-451.

Preparation and properties of germanium spheres prepared by ejection of molten droplets from a graphite crucible under pressure of a gas. Photographs, graph, diagrams. (C5, Ge)

104-C. Ultra-Pure Metal. *Metal Progress,* v. 65, Apr. 1954, p. 196, 198, 200.

New method for purification known as "zone melting" applied to germanium with good results. Impurities critical to semiconductor behavior are reduced as low as 1 to 10^{10}. 3 ref. (C21, Ge)

105-C. Preparation of Isotopic Lithium Metal by Thermochemical Reduction. P. S. Baker, F. R. Duncan and H. B. Greene. *Science,* v. 119, Apr. 9, 1954, p. 469-470.

Lithium chloride is reduced by barium metal. Photograph. Tables. 8 ref. (C26, Li)

106-C. On the Production of Pure Metals of the Titanium Group by Thermal Decomposition of Their Iodides. V. Titanium. J. D. Fast. *Henry Brutcher, Altadena, Calif., Translation no.* 3243, 22 p. (From *Zeitschrift für Anorganische und Allgemeine Chemie,* v. 241, 1939, p. 42-56.)

Production of ductile titanium by thermal decomposition of titanium iodide and deposition on an electrically heated wire. Graph, diagram, tables, photographs. 12 ref. (C4, Ti)

107-C. (French.) **The Effect of the Method of Casting on Distribution of Impurities in Aluminum and on the Appearance After Anodic Oxidation.** H. Richaud. *Revue de métallurgie,* v. 51, no. 1, Jan. 1954, p. 13-16.

Causes and remedies of impurities. Micrographs. 4 ref. (C5, Al)

108-C. (German.) **Copper Refining in Rotating Drums.** *Metallurgie und Giesserei Technik,* v. 4, no. 1, Jan. 1954, p. 31-32.

Efficiency compared with ordinary flame furnace. Diagrams, tables. (C21, Cu)

109-C (Russian.) **Cathodic Deposition of Nickel From Molten Chloride Baths.** S. F. Pal'guev and M. V. Smirnov. *Zhurnal Prikladnoi Khimii,* v. 26, no. 11, Nov. 1953, p. 1166-1175.

Quality of cathodic deposits shown to depend on current intensity. Diagram, tables, micrographs. 4 ref. (C23, Ni)

110-C. Separation of Tantalum and Niobium by Liquid-Liquid Extraction. J. R. Werning, K. B. Higbie, J. T. Grace, B. F. Speece and H. L. Gilbert. *Industrial and Engineering Chemistry,* v. 46, Apr. 1954, p. 644-652.

Batch and continuous countercurrent procedures compared and evaluated. Diagram, photographs, tables, graphs. 13 ref. (C28, Ta, Nb)

111-C. Electrical Nickel Smelting. I. Continuous Electric Smelting of Low Grade Nickel Ores. *Mining Journal,* v. 242, Apr. 9, 1954, p. 415-416.

Structures of ores tested described with preliminary tests and smelting procedures. Table. (C21, Ni)

112-C. (German.) **High-Temperature-Pressure Furnace.** G. Busch, F. Hulliger and U. Winkler. *Helvetica Physica Acta,* v. 27, no. 1, 1954, p. 74-80.

Design of furnace which can be rapidly heated to 5400° F. and operated under vacuum or up to 10 atmospheres. Diagrams, graph. 4 ref. (C21)

113-C. (Italian.) **Continuous Casting and Empirical Calculation of Descent Speed in Casting of Light Alloy Ingots.** G. Porro and P. Lombardi. *Alluminio,* v. 23, no. 1, Jan. 1954, p. 23-34.

Determines optimum casting speed in relation to size of aluminum ingots. Diagrams, graphs, tables. 12 ref. (C5, Al)

114-C. (Italian.) **Electrolysis of Molten Salts.** Marc Van Lancker. *Alluminio,* v. 23, no. 1, Jan. 1954, p. 40-45.

Metallic equilibrium and enthalpy relations. Study of aluminum production. 22 ref. (C23, P12, Al)

115-C. (Russian.) **Interaction of Metallic Copper With Copper Mattes.** N. P. Diev, V. V. Paduchev and A. F. Plotnikova. *Zhurnal Prikladnoi Khimii,* v. 27, no. 2, Feb. 1954, p. 127-135.

Results, method of investigation and dissolution mechanism at 1000 and 1200° C. Tables, graphs. 3 ref. (C21, Cu)

116-C. Production of Electrolytic Manganese. N. Dhananjayan, H. K. Chakrabarti and T. Banerjee. *Journal of Scientific & Industrial Research,* v. 13, sec. A, Feb. 1954, p. 136-144.

Electrolysis of solution containing sulfates of manganese and ammonia and sulfur dioxide in canvas diaphragm cell employing stainless steel cathode and lead anodes. Graphs, tables, diagram. 20 ref. (C23, Mn)

117-C. Floating Zone Recrystallization of Silicon. P. H. Keck, W. Van Horn, J. Soled and A. MacDonald. *Review of Scientific Instruments,* v. 25, Apr. 1954, p. 331-335.

Equipment to carry out recrystallization and zone melting, single crystals of resistivities up to several hundred ohm cm. have been grown. Photographs, diagrams. 5 ref. (C general, N5, Si)

118-C. (Hungarian.) **Energy Problem in the Electrolytic Reduction of Alumina.** Arisztid Czeke. *Kohaszati Lapok,* v. 9, no. 3, Mar. 10, 1954, p. 133-144.

Analytic method shows 13 to 15% of power could be saved with better construction and operation of Söderberg electrolytic cell. Diagram, nomograms, graphs, table. (C23, Al)

D

Ferrous Reduction and Refining

165-D. The Use of Oxygen in the Iron and Steel Industry in Western Europe. I. Georg Bulle. *Blast Furnace and Steel Plant,* v. 42, Apr. 1954, p. 419-423, 427.

Blast furnace practice, operation of openhearth furnace and steelmaking in electric furnaces, all using oxygen. (D1, D2, D5, ST)

166-D. A New Type of Automatic Blast Furnace Charging Control. Edward H. Abbe. *Blast Furnace and Steel Plant,* v. 42, Apr. 1954, p. 424-427.

Need for faster and more accurate charging of blast furnaces has become more pronounced. Nearly 3000 tons per 24-hr. period are loaded into the furnace by automatic control system. Photographs, diagram. (D1)

167-D. Manganese Recovery in the Basic Open Hearth Process. Norman F. Dufty. *Blast Furnace and Steel Plant,* v. 42, Apr. 1954, p. 428-430.

Data on lime-silica ratio of slag for optimum manganese recovery with assumption there was no danger of phosphorus reversion. Table, graphs. 7 ref. (D2, Mn, ST)

168-D. Development of Steelworks Instruments. D. W. Gillings. *Blast Furnace and Steel Plant,* v. 42, Apr. 1954, p. 434-442.

Present day and future lines of development in use of instrumentation. Graphs, photographs, diagrams. 17 ref.
(D general, S18, Fe, ST)

169-D. Properties and Applications of Iron Blast Furnace Slag. J. R. Wallace, P. Fedora and N. D. Weiner. *Canadian Mining and Metallurgical Bulletin,* v. 47, no. 503, Mar. 1954, p. 160-169; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 57, 1954, p. 92-101.

Historical background, types of slag, composition and properties. Uses include railway ballast concrete, highway and airport construction and fertilizer. Tables, graphs, photographs, diagrams. 9 ref.
(D1, B21, T general, Fe)

170-D. Rare Earth Additions Affect Surface Quality of Low Carbon Steel. J. V. Russell. *Journal of Metals,* v. 6, Apr. 1954, p. 438-442.

Effectively reduces sulfur content of steel and improves surface quality, apparently by increase of manganese-sulfur ratios. Graphs, photographs, table. 8 ref.
(D general, B22, CN, EG-g)

171-D. Nozzle Replacement From Outside Is Safe and Efficient Method. W. G. McDonough. *Journal of Metals,* v. 6, Apr. 1954, p. 443-446.

Entire interval from time of finish pouring to ladle ready for next heat is 12 to 15 min. As many as five 190-ton heats are tapped in same ladle during an 8-hr. turn. Pouring practice is regularly 96 to 98% good pouring. Photographs, diagram. (D9, ST)

172-D. Steelmaking Processes. Some Future Prospects. C. D. King. *Journal of Metals,* v. 6, Apr. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Apr. 1954, p. 455-465.

Openhearth, Bessemer, turbohearth, Linz-Donawitz and electric-furnace processes evaluated. Tables, diagrams, charts, graphs.
(D general, ST)

173-D. Chemical Reactions of Coke in the Iron Blast Furnace. James F. Peters. *Journal of Metals,* v. 6, Apr. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Apr. 1954, p. 466-474.

Solution loss defined; examples show it may either have a favorable or unfavorable effect on blast furnace performance. Theory explaining contradictions encountered during earlier studies. Tables, graphs. 13 ref. (D1, Fe)

174-D. Crucible Melting. *Metal Industry,* v. 84, Mar. 19, 1954, p. 229.

Advantages include low metal loss, good metallurgical conditions, close control of composition of alloys and homogeneity of melt, accurate temperature control, maximum flexibility, low capital cost, economy of floor space and low melting cost. 4 ref. (D8, ST)

175-D. The Low-Shaft Furnace. (Digest of "Exposé Général Sur le Bas Fourneau", H. Malcor; *Revue Universelle des Mines,* 1953, Aug., p. 470.) *Metal Progress,* v. 65, Apr. 1954, p. 190, 192, 194, 196.

Advantages and disadvantages of a low-shaft furnace for reducing iron ore to pig iron. (D8)

176-D. Desulphurization With Rare Earths. *Steel,* v. 134, Apr. 12, 1954, p. 110, 112, 117.

New test data add importance to rare earths in this application. Some heats showed better than 90% desulphurization. Slowing reversion time is a real problem. Photograph, graphs, table.
(D general, B22, EG-g, ST)

177-D. Top Blowing of Basic Bessemer Iron With Pure Oxygen. F. A. Springorum, K. G. Speith and W. Oelsen. *Henry Brutcher, Altadena, Calif., Translation no.* 3226, 25 p. (Condensed from *Stahl und Eisen,* v. 73, no. 1, 1953, p. 6-22.)

Previously abstracted from original. See item 111-D, 1953. (D3, CN)

178-D. Experiences With Ingot-Mold Washes. G. Kowarsch. *Henry Brutcher, Altadena, Calif., Translation no.* 3228, 11 p. (Condensed from *Stahl und Eisen,* v. 73, no. 25, 1953, p. 1654-1657.)

Previously abstracted from original. See item 103-D, 1954.

179-D. (French.) **A Method of Operation for Producing Thomas Steel Low in Nitrogen, Phosphorus, and Sulfur by Means of Oxygen Enriched Air.** P. LeRoy, M. Gombert and B. Trentini. *Revue de métallurgie,* v. 51, no. 1, Jan. 1954, p. 45-72.

Method uses oxygen enrichment

of blast, oxidizing additions, a small static height of bath, temperature control and a second slag. Tables, graphs. 10 ref. (D3, ST)

180-D. (French.) **Production of Physically Clean Steel. The P.A.P. Process. L. P. Coatings for Ingot Molds.** J. G. Platon. *Revue de métallurgie,* v. 51, no. 2, Feb. 1954, p. 109-114; disc., p. 114.

Deoxidation with molten aluminum and alkali salt additions permits complete killing of any type of steel. Alkaline flux mold washes improve surface quality. (D9, ST)

181-D. (French.) **Coke Consumption in Blast Furnace.** M. Brun and J. Szczeniowski. *Revue de métallurgie,* v. 51, no. 3, Mar. 1954, p. 154-164; disc., p. 164.

Method of regulating operation based on study of "useful heat of coke". Permits estimation of consumption and output. Graphs. (D1, B22)

182-D. (French.) **Study of Specimens of Slag Taken From Charges Blown in a Basic Bessemer Converter Without Additions of Lime.** Paul Kozakevitch and Pierre Leroy. *Revue de métallurgie,* v. 51, no. 3, Mar. 1954, p. 203-209.

Slag formed during first few minutes of blowing in absence of lime is acid and iron-bearing. After 16 min. slag becomes basic, is homogeneous and no longer contains metallic iron. Micrographs, tables. 6 ref. (D3, B21)

183-D. (German.) **The Development of Modern Open-Hearth Furnace on the Principle of Maerz System.** Friedrich Wilhelm Morawa. *Metallurgie und Giesserei Technik,* v. 4, no. 1, Jan. 1954, p. 3-12.

Data show lower cost of building and operation. Diagrams, graphs. 12 ref. (D2)

184-D. (German.) **Operating Experiences With a Double Cowper.** G. Naumann. *Metallurgie und Giesserei Technik,* v. 4, no. 1, Jan. 1954, p. 13-15.

Twin stoves render combustion stack superfluous. Diagram. 3 ref. (D1)

185-D. (German.) **Problem of Pig Iron Production in Low-Stack Furnace.** Kurt Säuberlich and Reinhold Baake. *Metallurgie und Giesserei Technik,* v. 4, no. 2, Feb. 1954, p. 55-60.

Successful smelting of low-grade iron ores with low-grade cokes. Methods of overcoming high sulfur content. Tables, diagrams, graph. (D8, CI)

186-D. (German.) **Present Status of Open-Hearth Operation in the German Democratic Republic.** Karl-Friedrich Lüdemann. *Metallurgie und Giesserei Technik,* v. 4, no. 2, Feb. 1954, p. 85-90; disc., p. 90-94.

Investigates output of 32 furnaces. Success of Maerz furnace design; essential features of rapid melting. Graphs. 8 ref. (D2, ST)

187-D. (German.) **Contribution to Metallurgy of Refining Steel by Top-Blowing.** Heinrich Rellermeyer and Theo Kootz. *Stahl und Eisen,* v. 74, no. 7, Mar. 25, 1954, p. 381-395.

Experimental plant and conditions of blowing with air, oxygen-enriched air and pure oxygen. Type and number of heats, blowability and manganese slagging. Tables, graphs, diagrams. 45 ref. (D3, ST)

188-D. The Basic Open Hearth Process. II. Further Theoretical Considerations. G. Reginald Bashforth. *British Steelmaker,* v. 20, Apr. 1954, p. 134-138.

Physical chemistry and thermodynamics of steelmaking and deoxidation. Observations on avoidance of blowholes due to occluded gases. Choice of suitable deoxidizers to prevent nonmetallic inclusions in finished steel. 21 ref. (D2, ST)

189-D. New 10-Ton Arc Furnace for Darwins. *British Steelmaker,* v. 20, Apr. 1954, p. 140-142.

Constructional features of new top-charge electric furnace. Photograph, diagram. (D5, ST)

190-D. Fireclay for Blast Furnaces. Britton T. Day and Richard F. Baley. *Industrial Heating,* v. 21, Apr. 1954, p. 768, 770, 772.

Physical properties discussed in attempt to present a generalization of what constitutes a good fireclay. (D1)

191-D. Flame Radiation and Open Hearth Productivity. M. W. Thring. *Iron & Steel,* v. 27, Apr. 1954, p. 121-123, 132.

Objectives of openhearth furnace research; extent of flame radiation as a factor on openhearth productivity; and relation of input variables to flame radiation. Diagram, table. 3 ref. (D2, ST)

192-D. Electric Furnace Operation. F. S. Leigh. *Iron & Steel,* v. 27, Apr. 1954, p. 133-138.

Trends in modern design of switch gear and furnaces. Photographs. (To be continued.) (D5)

193-D. The Future of Steel Melting. M. W. Thring. *Iron and Steel Institute, Journal,* v. 176, Apr. 1954, p. 424-432.

Openhearth furnace brought up to an over-all thermal efficiency of 50% by various steps. Continuous-counter-flow steelmaking process would have theoretical thermal efficiency of 70% on cold metal. Graphs, tables, diagrams. 4 ref. (D2, ST)

194-D. Quality Control in the Production of High-Sulphur Open Hearth Steels. J. H. Flaherty, Jr. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 32, 1953, p. 13-19.

Elimination of silicon in the block and other modifications of practice greatly improved quality of free-cutting steels. Graphs, table, micrographs. (D2, CN)

195-D. Sand for Acid Open Hearths. Douglas C. Williams. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 42-45; disc., p. 51-66.

Composition, behavior and applications of suitable material. Tables. 14 ref. (D2)

196-D. Bottom Repair in Acid Open Hearth Furnaces. J. Benedict Kopec. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 46-51; disc., p. 51-66.

Variables in obtaining good repairs. Tables, graphs. (D2)

197-D. Comments on Quality Problems. Open Hearth vs. Electric Furnace. A. H. Osborne. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 67-68; disc., p. 72-74.

Nitrogen content of rimming electric steel reduced by using pig iron in the charge. Zinc and lead residuals reduced by spiegel, repig or by electrode dipping. (D2, D5, CN)

198-D. Quality of Alloy Steels. Open Hearth vs. Electric Furnace. B. R. Queneau. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 69-70; disc., p. 72-74.

Shows openhearths can produce low-alloy steels with quality approaching electric furnace melts if proper precautions are made. Table. (D2, D5, AY)

199-D. Quality of Similar Grades of Carbon and Alloy Steels, Open Hearth vs. Electric Furnace. Walter Huhn. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 71-72; disc., p. 72-74.

Compares practices at Crucible Steel. (D2, D5, ST)

200-D. Production and Quality of AISI C-1200 Series Screw Steels. S. Feigenbaum. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 75-76; disc., p. 78-79.

Experience shows openhearth screw steels are better quality and more uniform than bessemer grades. Table. (D2, CN)

201-D. Production and Quality of AISI C-1200 Series Screw Steels. I. A. Sirel. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 77-78; disc., p. 78-79.

Furnace practice and experience at Youngstown Sheet and Tube. (D2, CN)

202-D. Rimmed vs. Capped Steel. R. D. Hindson. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 85-87.

Advantages and limitations of both grades for various applications. Photographs. (D2, T general, CN)

203-D. Rimmed and Capped Steels. A. N. Swanson. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 85-87.

Compares yields and characteristics for both mechanically and chemically capped ingots. (D2, CN)

204-D. Factors Affecting Surface Quality of Aluminum-Killed Deep-Drawing Steel Sheets. R. J. Walter. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 88-90; disc., p. 95.

Most common defects and remedial procedures. (D2, CN)

205-D. Factors Affecting Surface Quality of Aluminum-Killed Deep-Drawing Sheets. W. R. Huber and E. L. Robinson. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 90-95; disc., p. 95.

Cracking, scabs, deoxidation products, and their prevention. Photographs. (D2, CN)

206-D. Effect of Restricted Uptake Design on Refractory Consumption and Production Rate. E. B. Speer. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 111-115; disc., p. 119-120.

Compares refractory and fuel consumption and production rates of redesigned furnaces with normal furnaces in same shop. Diagram, photograph, graphs. (D2)

207-D. Effect of Restricted Uptake Design on Production Rate and Refractories Consumption. M. J. Smith. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 116-119; disc., p. 119-120.

Results of current trials at Ford plant. Diagram, graphs. (D2)

208-D. Economics of Port-End Construction. E. B. Speer. *National Open Hearth Committee of the Iron and Steel Div. of A.I.M.E., Proceedings,* v. 36, 1953, p. 121-122; disc., p. 128-129.

Variables to be considered in design. (D2, A4)

209-D. Economics of Port-End Construction. A. J. Voss. *National Open Hearth Committee of the Iron and*

Steel Div. of the A.I.M.E., Proceedings, v. 36, 1953, p. 122-123; disc., p. 128-129.

Experience at Inland Steel with various materials and designs. Tables. (D2, A4)

210-D. Economics of Open Hearth Port-End Construction. A. H. Sommer. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 124-127; disc., p. 128-129.

Costs based on design and use of basic, silica or superduty refractories. Diagram, table. (D2, A4)

211-D. Economics of Open Hearth Furnace Port-End Construction, Large Plants Versus Small Plants. W. J. Scharfenaker. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 127-128; disc., p. 128-129.

Fundamental differences to be considered in different sized plants. (D2, A4)

212-D. Hinged Slag-Pocket Doors. M. H. Weir. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 130-134.

Experience at Sheffield Steel Corp. on replacement of bulkheads with swinging doors. Photographs, table. (D2)

213-D. Use of Special Explosives for Slag Removal. J. O. Dague. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 134-139; disc., p. 142.

Development of satisfactory methods and materials at Bethlehem Steel Co.'s Lackawanna plant. Photographs. (D2)

214-D. Use of Special Explosives for Slag Removal. W. E. Brandt. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 140-142; disc., p. 142.

Use of built-in shot holes and mechanical loading reduced removal time to 8 to 16 hr. Diagram, photographs. (D2)

215-D. Steam Jet System for Removal of Flue Dust. John L. Peterson. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 143-146; disc., p. 146.

Savings in time and labor; no decrease in operating efficiency toward end of campaign. Drawing, photographs. (D2, A5)

216-D. Monolithic Refractories in Furnace Spouts. V. W. Jones. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 147-150; disc., p. 155.

Rammed basic lining cuts costs and greatly reduces safety hazards. Photographs. (D2)

217-D. Monolithic Linings Successful at Crucible Steel Company. G. M. Burrier. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 151-153; disc., p. 155.

Practice and experience at Midland Works. Photographs, drawing. (D2)

218-D. Monolithic Refractories in Furnace Spouts at Bethlehem Steel Company. J. C. MacNeill. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 154-155; disc., p. 155.

Practice and experience with rammed linings. Photographs, table. (D2)

219-D. Checker Problems. R. S. Bowers. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 156-157; disc., p. 161-167.

Design, efficiency, and cleaning of checkers. (D2)

220-D. Checker Problems at Inland Steel Company. George C. Lawton. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 159-160; disc., p. 161-167.

Composition of materials and operating practices. Tables. (D2)

221-D. Auxiliary Stack Checkers. Charles N. Straney. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 161; disc., p. 161-167.

Preheating of air before it enters regular checkers decreased fuel consumption. (D2)

222-D. Continuous Oxygen Analysis for Combustion Control in the Open Hearth. F. P. Hubbell. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 169-173; disc., p. 173-176.

Equipment and operating procedures. Diagram, table, photographs, graphs. (D2)

223-D. Atomization of Liquid Fuels as Related to the Overall Operation of Open Hearth Furnaces. G. C. Primm. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 177-179; disc., p. 179-180.

Methods of obtaining desired flame characteristics. Concludes that use of gas or air as atomizing agents is better than change in design of burners and atomizers. Table. (D2)

224-D. Significance, Factors Involved, and Maintenance of Air Preheat. J. H. Kelley and G. E. Wenzel. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 181-184; disc., p. 184-185.

Experience at Bethlehem's Sparrows Point plant illustrates how basic information is translated into practice. (D2)

225-D. Manual Control of Firing Methods. H. W. Potter. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 186-187; disc., p. 187-188.

Design of burners and practice at Lukens Steel Co. Table, diagram, photographs. (D2, S16)

226-D. Scheduling Combustion Practice. J. R. Deppish. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 188-192.

Need and advantages of controlled firing schedules. Table, chart. (D2)

227-D. Manual Control of Firing Rates at the Open Hearth by Roof-Temperature Measurements. L. N. McDonald. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 192-193.

Instrumentation and operation at Edgar Thomson Works. (D2, S16)

228-D. Automatic Open Hearth Roof-Temperature Control. F. S. Swaney. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 193-197; disc., p. 201.

Instrumentation and practice at J & L's Pittsburgh Works. Photographs. (D2, S16)

229-D. Automatic Roof-Temperature Control on Tilting Open Hearth Furnaces. Arthur W. Thornton. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 198-200; disc., p. 201.

Equipment and practice at U.S. Steel's National Works. Table. (D2, S16)

230-D. Front-Wall Rayotube Installation Used at Geneva Works. E. Richards. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 200-201; disc., p. 201.

Installation and experience at U.S. Steel's Geneva Works. (D2, S16)

231-D. Heating Up Open Hearth Furnaces After Rebuilds. Charles N. Jewart. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 202-208.

Experience at Bethlehem Steel compared with industry-wide data. Graphs, photographs, drawing. (D2)

232-D. Open Hearth Furnace Design at Fairless Works. H. A. Parker. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 209-215; disc., p. 217-219.

Design and arrangement of furnaces and auxiliary equipment. Photograph, diagrams. (D2)

233-D. Recent Trends in Furnace Design in New Plants. A. K. Moore. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 215-217; disc., p. 217-219.

Shop and furnace improvements at Steel Co. of Canada's No. 3 shop. (D2)

234-D. New Bottoms and Refractories Used in Bottom Repair. J. F. Pollack. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 220-221; disc., p. 223.

Materials and methods for eliminating bottom troubles. (D2)

235-D. New Bottoms and Refractories Used in Bottom Repairs. A. M. Kroner. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 221-223; disc., p. 223.

Advantages of fully rammed bottoms. Practice and experience at Inland Steel. (D2)

236-D. Significance Study of Open Hearth Variables. W. R. Weaver. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 224-225; disc., p. 226-229.

Multiple correlation technique of statistical analysis. Its application covering 23 variables in 125 heats. Graphs, table. (D2, S12)

237-D. Productivity by the Use of Oxygen as Complicated by Sulphur Limitations. J. E. Hood. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 230-232.

Advantages and limitations of lancing operations. Tables. (D2)

238-D. Productivity by Use of Oxygen Lance as Complicated by Sulphur Limitations. L. R. Berner. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 233; disc., p. 233-234.

Experience at Inland Steel's No. 2 plant. Table. (D2)

239-D. Jet Tappers. R. W. Smith. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 234-235; disc., p. 235-236.

Advantages and savings obtained at U.S. Steel's Gary Works. (D2)

240-D. Hydraulically Operated Ladle Stoppers. T. J. Hoby. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 236-244.

Construction, operation and advantages of Autopour ladle equipment. Diagram, photographs, table. (D9)

241-D. Comparison of the Electric and Open Hearth Furnaces on an Economic Basis. T. R. Scott. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 245-247; disc., p. 251-252.

Data from openhearths and new electric installation at Sheffield Steel. (D2, D5, ST)

242-D. Economics of Electric Furnace vs Open Hearth With All Cold Metal Charge. J. E. Wilbanks. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 248-249; disc., p. 251-252.

Experience at Atlantic Steel Co. indicates lower cost for electric furnace when same grades are produced in all cold metal practice. Table. (D2, D5, ST)

243-D. Comparative Economics of Open Hearth and Electric Furnace Operation. C. L. King. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 250-251; disc., p. 251-252.

Good competitive position of electric furnace is indicated by experience at Kansas City plant of Sheffield Steel. (D2, D5, ST)

244-D. Effect of Reduced Aluminum Deoxidation on Cast Steel. A. W. Fastabend. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 253-260; disc., p. 260-261.

Practice resulted in lower tendency to hot tearing. Graphs, tables, diagram. 5 ref. (D2, CI)

245-D. Factors in Producing Quality Steel. C. F. Henzelman. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 262-264; disc., p. 264-265.

Factors leading to desired quality, including pouring practice. (D2, D9, ST)

246-D. Rammed and Castable Refractories for Open Hearth Service. R. R. Fayles. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 265-267; disc., p. 267-269.

History and recent developments point to increasing use. (D2)

247-D. Recarburizing Heats With Coal or Coke Injected by Compressed Air. R. C. Buehl, R. J. Leary and E. J. Ostrowski. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 269-275; disc., p. 275-278.

Tests made in laboratory furnace indicate practice is effective, rapid and convenient. Table, diagram, photograph, graphs. (D2, ST)

248-D. Taboos Slag Pocket Build-Up. *Steel,* v. 134, Apr. 26, 1954, p. 112, 115.

Reflectors in openhearth slag pockets free gas of entrained solids and eliminate need for lancing of checker system. Photo, diagram. (D2)

249-D. (English.) **High-Speed Steels, Their Origin, Development and Prospects.** *Aciers Fins & Spéciaux Francais,* 1954, no. 16, Feb., p. 23-27.

History and production of different steel alloys in various countries. Photographs. (D general, AY, Cr, W, Co, Mo)

250-D. Industry Looks at Oxygen Blown Steel. *Steel,* v. 134, May 3, 1954, p. 104, 106, 109, 110, 113.

Techniques and advantages of an Austrian converter process. (D3, ST)

251-D. (German.) **Problems of Pig Iron Production.** S. Henkel. *Metallurgie und Giesserei Technik,* v. 4, no. 3, Mar. 1954, p. 101-105.

Bloomery process preferred for smelting low-grade acid ores over low-shaft furnace because of greater economy and lower coke consumption. Tables, diagrams. 22 ref. (D8, D1, CI)

252-D. (Hungarian.) **Uniformity in the Change of Hydrogen Content of Openhearth Steel.** Jozsef Verö. *Kohaszati Lapok,* v. 9, no. 3, Mar. 10, 1954, p. 100-101.

Theoretical considerations, based on work by Piper, show increase of hydrogen content follows regular pattern. Graphs. (D2, ST)

253-D. (Book.) **National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings, (Annual Volume),** v. 36, 1953. 303 p. American Institute of Mining and Metallurgical Engineers, 29 West 39th St., New York 18, N. Y.

Includes 67 technical papers which are individually abstracted. (D2, ST)

E Foundry

269-E. Aluminum Die-Castings for N1 Carrier. Ludwig Pedersen. *Bell Laboratories Record,* v. 32, Apr. 1954, p. 144-147.

Electronic circuits must be mounted in durable, inexpensive and easily maintained frames that are physically compact. Photographs. (E13, T1, Al)

270-E. Horizontal-Axis Centrifugal Casting. A. J. Gibbs Smith. *Canadian Metals,* v. 17, Apr. 1954, p. 28, 32.

Equipment and techniques for production of cast iron pipe. Photographs, diagram. (E14, CI)

271-E. Developments With Synthetic Resins in the Foundry. P. G. Pentz. *Engineering,* v. 177, Mar. 26, 1954, p. 404-405.

Furane or furfurane, a colorless liquid insoluble in water, forms resins in presence of mineral acids. It may find application as a protective surface coating on core carriers made with ordinary liquid synthetic-resin core-sand mixes. (E18)

272-E. Cost Factors in Electric-Furnace Operation. F. S. Leigh. *Foundry Trade Journal,* v. 96, Mar. 18, 1954, p. 293-296.

Melting units critically analyzed with respect to capital and operating costs, method of use and metallurgical results. Tables. (E10, CI)

273-E. Testing the Gas Content of Molten Metals. G. Ohira and V. Kondic. *Foundry Trade Journal,* v. 96, Mar. 25, 1954, p. 331-333.

Method based on principle of slowly solidifying small cylindrical casting, design of which insures good feeding during solidification. Density of cylinder found to bear direct relation to gas content of molten metal. Diagrams, graphs. 9 ref. (E25)

274-E. The Arc Melting of Metals and Its Application to the Casting of Molybdenum. G. L. Hopkin, J. E. Jones, A. R. Moss and D. O. Pickman. *Institute of Metals, Journal,* v. 82, Apr. 1954, p. 361-373 + 2 plates.

Materials, equipment and techniques. Micrographs, diagrams, photographs, graph, table. 7 ref. (E10, Mo)

275-E. Designing Small Die Castings. *Machine Design,* v. 26, Apr. 1954, p. 181-183.

Basic recommendations assure suitable design features on small parts. Diagrams. (E13)

276-E. Melting Furnaces for Copper-Based Alloys. *Machinery Lloyd (Overseas Ed.),* v. 26, Mar. 27, 1954, p. 102-103.

Melting problems overcome by new furnace using continuous melting. Metal losses and fuel costs are low. Photographs. (E10, Cu)

277-E. Casting in Semi-Permanent Ceramic Moulds. *Machinery (London),* v. 84, Mar. 19, 1954, p. 589-597.

For high-accuracy uncored castings of simple shape without flanges or re-entrant angles which may hinder free contraction during cooling. Photographs. (E19)

278-E. The Control of Production Variables in Die Casting. H. K. Barton and L. C. Barton. *Machinery (London),* v. 84, Mar. 26, 1954, p. 658-666.

Metal analysis, injection temperature and pressure, die temperature, duration of casting cycle, condition of vents, mechanical efficiency of die, frequency of die and cavity lubrication and cooling of castings. Diagrams, graphs. (E13)

279-E. Mechanized Cupola Charging Plant. *Mechanical Handling,* v. 41, Apr. 1954, p. 176-179.

Plant produces castings for cylinder blocks, heads and liners with greater efficiency. Diagram, photographs. (E10, CI)

280-E. Founding Magnesium-Base Alloys. XII. Coring. M. Caillon. *Metal Industry,* v. 84, Mar. 19, 1954, p. 232-234.

Factors to consider in core design and use. Principles for location and attachment of risers. Diagrams. (To be continued.) (E21, E22, Mg)

281-E. Founding Magnesium-Base Alloys. XIII. Design Modifications. M. Caillon. *Metal Industry,* v. 84, Mar. 26, 1954, p. 247-248.

Two examples of change in design leading to simplification of mold, reduction in set-up time and use of equipment. Diagrams. (To be continued.) (E19, Mg)

282-E. Duplexing in the Foundry. Combination of Cupola and Electric Arc Furnace. Francis J. Knight. *Metallurgia,* v. 49, no. 293, Mar. 1954, p. 137-138.

Increased production of good quality castings at reduced cost. Photographs. (E10, CI)

283-E. Casting Stainless Steel in Shell Molds. H. J. Cooper and M. L. Katz. *Metal Progress,* v. 65, Apr. 1954, p. 102-106.

Reviews shell molding of stainless steel. Shell mold process utilizes thermosetting properties of phenolic or urea resins to provide a bond for silica or zircon sand in construction of mold. Photographs. (E16, SS)

284-E. Aircraft Structural Parts Can Be Die Cast. Elmer Van Sickle. *Precision Metal Molding,* v. 12, Apr. 1954, p. 33, 133.

Landing gear wheels with high impact strength and light weight can be secured in either aluminum or magnesium die castings. Photograph. (E13, Al, Mg)

285-E. In Railway Equipment Zinc Die Castings Replace Gray Iron. W. B. Wells. *Precision Metal Molding,* v. 12, Apr. 1954, p. 36.

Conversion to zinc casting results in reduced cost and weight. Photograph. (E13, Zn, CI)

286-E. Plumbing Fittings by Die Casting. *Precision Metal Molding,* v. 12, Apr. 1954, p. 46-47, 132.

Cast threads, knurling, intersecting and tapered holes are among features obtained without extra machining costs by virtue of die casting process. Photographs. (E13)

287-E. Two New Ways to Fasten Shell Mold Halves. *Precision Metal Molding,* v. 12, Apr. 1954, p. 99-100.
New and effective technique uses special clips or fasteners. Photographs. (E16)

288-E. Tricks That Make Shell Molding Click. W. H. L. Bryce. *SAE Journal,* v. 62, Apr. 1954, p. 32-33.
Precautions designers should observe in specifying tolerances, finishes and mechanization. Drawing. (E16)

289-E. (German.) **Design of Molding Machines With Compressed-Air Drive.** J. Broberg and L. Villner. *Giesserei,* v. 41, no. 6, Mar. 18, 1954, p. 129-134.
Choice of materials, weight of machines, foundation and design from standpoint of ease of cleaning, repairing and lubricating and protection from sand. Diagrams, photographs. (To be continued.) (E17)

290-E. (German.) **Operation and Operating Data on an 800-Kg Low-Frequency Induction Crucible Melting Furnace.** H. Rohn. *Giesserei,* v. 41, no. 6, Mar. 18, 1954, p. 134-137.
Economy shown by actual melting operations. Diagram, photographs, tables. (E10)

291-E. (German.) **Flow Properties and Degree of Compressibility of Mold Materials.** K. Wittmoser. *Giesserei,* v. 41, no. 6, Mar. 18, 1954, p. 140-141.
Pressure versus degree-of-compression curves require correction for each substance examined. Graphs, table. 3 ref. (E18)

292-E. (German.) **Heat-Conducting Pipe Eliminators.** Béla Tisza. *Giesserei,* v. 41, no. 6, Mar. 18, 1954, p. 142-147.
Risers of molds for highly shrinking metals can be considerably reduced by covering their surface with insulating or exothermic pipe eliminators. Diagrams, tables, photographs. (E22)

293-E. (German.) **Sand-Contamination With Steel. Sand Spots and Scabbing in Steel Casting.** Wolfgang Kilian. *Metallurgie und Giesserei Technik,* v. 4, no. 1, Jan. 1954, p. 34-36.
Difficulties related to grain size of the sand, temperature and time. Graphs, micrograph. 8 ref. (E18, CI)

294-E. The Residual Oxygen Content of Cupola-Melted Gray Cast Iron. E. A. Loria and H. W. Lownie, Jr. *American Society for Metals, Transactions,* v. 46, 1954, p. 409-417.
Critical survey of published data on vacuum-fusion analysis of cast iron. Explains high values reported in literature. Deoxidation theory for iron and steel. Table. 8 ref. (E10, S11, CI)

295-E. Producing Titanium Alloy Castings. Marvin Glassenberg and M. J. Berger. *American Foundryman,* v. 25, May 1954, p. 107-112. (AFS Convention Preprint no. 54-35.)
Furnace for melting and casting titanium was developed. Industrially important castings were produced in zircon shell, dry silica sand and graphite molds. Photographs, diagrams, tables. 3 ref. (E10, Ti)

296-E. Gating and Risering of Magnesium Alloys. II. H. E. Elliott. *American Foundryman,* v. 25, May 1954, p. 113-122. (AFS Convention Preprint no. 54-42.)
Rejects due to contraction in passing from liquid to solid state, their causes, measures to correct them. Diagrams. 8 ref. (E22, Mg)

297-E. Pre-Mixing of Reconditioning Materials for Molding Sand. Burdette Jones. *American Foundryman,* v. 25, May 1954, p. 123-126. (AFS Convention Preprint no. 54-30.)
Premixing of sand additives results in saving of materials, better control of sand properties and a cleaner sand conditioning department. Additions were bentonite, sea coal and wood flour or a treated cellulose. Diagram, chart. (E18)

298-E. Cupola Melting of Cast Iron Borings and Steel Turnings. W. Y. Buchanan. *American Foundryman,* v. 25, May 1954, p. 127-137. (AFS Convention Preprint no. 54-67.)
Experiences in melting comparatively finely divided cast iron and steel in cupolas. Diagrams, photographs, tables. (E10, CI)

299-E. After Three Years: Developments in Shell Molding. E. I. Valyi. *American Foundryman,* v. 25, May 1954, p. 138-143. (AFS Convention Preprint no. 54-75.)
Significant contributions to art of shell molding. Includes coating of sand, shell forming, pattern heating and curing. Photographs. (E16)

300-E. Automatic Mold Stacking. Greg Minogue. *American Foundryman,* v. 25, May 1954, p. 144-146.
New type blow-squeeze machines are push-button operated, fully automatic, one cycle operation and controlled by electric motor-driven cam timers which actuate solenoid valves. Photographs. (E19)

301-E. How to Modernize Your Foundry. Lester B. Knight. *Foundry,* v. 82, May 1954, p. 132-139.
Judicious spending to keep plants modern and to permit worker to produce the most for his efforts can increase quality, production, wages and profits. Photographs, diagrams. (E general)

302-E. Automation in the Foundry. William E. Dougherty. *Foundry,* v. 82, May 1954, p. 140-145.
Equipment, plant layout and operating procedures. Diagram, photographs. (E general, A5)

303-E. Inventory of Foundry Equipment. *Foundry,* v. 82, May 1954, p. 146-163.
Molding and coremaking, sand preparation, melting and heat treating, materials handling, cleaning and finishing. Tables. (E general, A5)

304-E. Equipment for the Small Foundry. *Foundry,* v. 82, May 1954, p. 164-197.
Molding, coremaking, sand conditioning, yard work and furnace charging, melting and pouring, shakeout and cleaning and related equipment including air compressors, heat treating ovens and exhaust and dust collection systems. Photographs, (E general)

305-E. Dermatitis Prevention in the Foundry Industry. Floyd van Atta. *Foundry,* v. 82, May 1954, p. 289 + 5 pages.
Equipment and preventative techniques. Photographs. (E general, A7)

306-E. Factors in Quoting on Aluminum Castings. E. Carrington. *Foundry,* v. 82, May 1954, p. 316 + 4 pages.
Quantity, alloy type, machining operations, heat treatment and others. (E general, A4, Al)

307-E. New Electrode Control. H. F. Arndt and R. J. Songer. *Foundry,* v. 82, May 1954, p. 325, 333.
Substantial savings in operating costs indicated through use of magnetic amplifier arc control. Photographs. (E10)

308-E. Employs Close Control in Die Casting Magnesium. Thomas A. Dickinson. *Foundry,* v. 82, May 1954, p. 339, 342, 344.
Close control of temperature variations results in substantial reduction in casting rejects. Photographs. (E13, Mg)

309-E. Blowing Machine. L. E. Hexamer and G. A. Conger. *Foundry,* v. 82, May 1954, p. 351, 354, 356.
Equipment for making shell molds and cores. Photographs. (E16)

310-E. Mechanical Handling Raises Foundry's Efficiency. Francis A. Westbrook. *Foundry,* v. 82, May 1954, p. 362, 364, 366.
Equipment, plant layout and operating techniques. (E general, A5)

311-E. Centrifugal Casting on the Continent. *Foundry Trade Journal,* v. 96, Apr. 1, 1954, p. 359-361.
Current practices in production of cast iron pipe. Photographs, diagrams. (E14, CI)

312-E. The First Half-Century in the History of the Institute of British Foundrymen. T. Makemson. *Foundry Trade Journal,* v. 96, Apr. 8, 1954, p. 379-391.
Review of organization's foundation and growth. (E general, A9)

313-E. Development of the Foundry Industry During the Past Fifty Years. V. C. Faulkner and S. H. Russell. *Foundry Trade Journal,* v. 96, Apr. 8, 1954, p. 399-418.
Progress in all sections of foundry industry during the period under review. Diagrams, photographs. (E general)

314-E. Two Methods of Moulding the Same Casting. Harold Haynes. *Foundry Trade Journal,* v. 96, Apr. 8, 1954, p. 419-422.
Machine molding and hand-ramming methods compared. Photographs. (E19)

315-E. Balanced Production of Malleable. A. R. Parkes. *Foundry Trade Journal,* v. 96, Apr. 15, 1954, p. 437-447.
Equipment, plant layout and operating procedures. Photographs, diagrams, tables. (E11, CI)

316-E. Lower Foundry Costs Start With Part Design. Edward W. Moir. *Iron Age,* v. 173, Apr. 15, 1954, p. 128-131.
For low casting cost, high production rates and top quality avoid core designs which make foundry production difficult. Photographs, diagrams. (E21)

317-E. Improving Casting Yields. D. E. Brooks. *Iron & Steel,* v. 27, Apr. 1954, p. 131-132.
Insulating material and method of application to decrease speed of cooling of riser with respect to that of casting, thereby permitting use of smaller risers and increasing casting yields. Table. 3 ref. (E22)

318-E. The Solidification of Nodular Iron. H. Morrogh. *Iron and Steel Institute, Journal,* v. 176, Apr. 1954, p. 378-382 + 2 plates.
Cooling-curve and quenching experiments indicate graphite nodules may form directly from liquid. Sites of decomposed carbide may be recognized by segregation of nickel. Various solidification sequences suggested. Micrographs, table, graph. 7 ref. (E25, CI)

319-E. The Growth of Nodular Graphite. M. Hillert and Y. Lindblom. *Iron and Steel Institute, Journal,* v. 176, Apr. 1954, p. 388-390 + 1 plate.
Graphite spherulites grow by screw dislocations generated by the inclusion of foreign atoms in graphite lattice. Autoradiography shows rare earth elements to be uniformly distributed through spherulites present in a nickel-carbon alloy treated with misch metal. Photograph, diagrams, micrographs. 6 ref. (E25, CI)

320-E. Shell Mould Casting of Motor Car Parts. James H. Smith. *Machinery (London),* v. 84, Apr. 2, 1954, p. 687-694.
Machining costs pared by close tolerance casting. Casting procedure is discussed. Photographs. (E16)

321-E. Gating Technique. A. De Jong. *Metalen,* v. 9, no. 6, Mar. 31, 1954, p. 85-89.

Advantages of knock-off risers in iron and steel casting and for all types of sand casting not using aluminum in the alloy. Table, diagrams. 5 ref. (E22, CI)

322-E. Manufacture of Cast Iron Service Pipes. *Times Review of Industry,* v. 8, new ser., Apr. 1954, p. 26, 29.

Existing types of pipes, various processes employed and latest developments in manufacture. Photograph, tables. (E general, CI)

323-E. Brass Die Casting Costs Reduced With Electric Induction Furnaces. Lewis B. Reed. *Western Metals,* v. 12, Apr. 1954, p. 53-54.

Solves some problems of fuel-fired furnaces. Cleaner, thoroughly alloyed metal, no wasted time in waiting for metal to reach temperature, no shutdowns to change crucibles and satisfactory refractory life. Photographs. (E13, Cu)

324-E. (Dutch.) **Magnets Cast in Shell Molds.** J. Kuipers. *Metalen,* v. 9; *Handel en Industrie,* v. 9, no. 5, Mar. 15, 1954, p. 34-35.

Methods of shell molding as applied to magnets. Relative merits of sand casting and shell molding. Photograph, table. (E16, E11)

325-E. (German.) **Working of Zinc-Base Materials. Current-Supply Installations for Melting in Low-Frequency Induction Furnaces.** E. Bartuska and K. Köller. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben,* v. 99, no. 3, Mar. 1954, p. 41-47.

Working by noncutting methods. Design of furnace and current-supply arrangements for melting of zinc and its alloys. Photograph, diagrams. 6 ref. (E10, Zn)

326-E. (German.) **Design of Molding Machines With Compressed-Air Drive.** J. Broberg and L. Villner. *Giesserei,* v. 41, no. 7, Apr. 1, 1954, p. 153-160.

Suggested improvements for increased efficiency. Photographs, diagrams. (E19)

327-E. (German.) **Centrifugal Machines for Casting Bearings for Railway Equipment of the German Federation.** *Giesserei,* v. 41, no. 7, Apr. 1, 1954, p. 168-170.

Design and operation of Göttinger and Hall machines especially designed for lining bearings. Diagrams. (E14)

328-E. (Swedish.) **Work Simplification in Foundries.** Lars Boman. *Gjuteriet,* v. 44, no. 3, Mar. 1954, p. 35-42.

Methods of analysis and survey of stack molding unit. Diagrams, tables, photographs. (E general)

329-E. (Swedish.) **Feeding and Solidification. III. Types of Feeding and Neck Core.** K. Åkesson. *Gjuteriet,* v. 44, no. 3, Mar. 1954, p. 43-50.

Function and use of atmospheric feeders; advantages and limitations compared with ordinary risers. Neck core materials, dimensions and position in the mold. Diagrams, table, graphs. 13 ref. (E23, E25)

330-E. Basic Lined Cupola Cuts Costs, Improves Quality. T. M. Frazell and J. D. Sheley. *Iron Age,* v. 173, Apr. 29, 1954, p. 85-88.

Lining life is increased, less refractory per ton of metal melted is used, and cheaper grades of pig iron and coke may be used. Lower sulfur contents at the spout and high manganese recovery possible. Tables, graphs, diagram. (E10, CI)

331-E. Founding Magnesium-Base Alloys. XIV. Test Bars and Patterns. XV. Running Systems. XVI. Gating. XVII. Cooling in the Mold. M. Caillon. *Metal Industry,* v. 84, Apr. 2, 1954, p. 271-272; Apr. 9, 1954, p. 285-288; Apr. 16, 1954, p. 308-309; Apr. 23, 1954, p. 328-331.

Comprehensive survey of molds and methods of pouring and chilling castings. Graphs, tables, diagrams. (E17, E22, E25, Mg)

332-E. (German.) **New Core-Molding Process.** Fritz Brunn. *Metallurgie und Giesserei Technik,* v. 4, no. 3, Mar. 1954, p. 113-116.

Use of clay-free quartz sand and water glass hardened by injection of CO_2. Tables, photographs. (E19)

333-E. (German.) **Core Making With Water Glass and Carbon Dioxide in Iron Foundry.** Fritz Naumann. *Metallurgie und Giesserei Technik,* v. 4, no. 3, Mar. 1954, p. 116-117.

Method for gray iron casting by inclusions of 10.4% used sand and 10.4% coal dust. Photographs. (E21, CI)

334-E. (German.) **Production of Chill-Mold Gray Iron Castings With Permanent Cast-Iron Molds.** Fritz Naumann. *Metallurgie und Giesserei Technik,* v. 4, no. 3, Mar. 1954, p. 118-124.

Economic use of cast iron molds for mass production in small foundries. Photographs, diagrams. (E12, CI)

335-E. (German.) **Metallurgical Principles in Development of Melting Units in Nonferrous Metal Foundry.** A. H. F. Goederitz. *Metallurgie und Giesserei Technik,* v. 4, no. 3, Mar. 1954, p. 130-136.

Suitability of various melting furnaces from economic viewpoint, design and metallurgical considerations. Diagrams, photographs. 36 ref. (E10)

336-E. (Hungarian.) **Alloyed Cast Iron Produced Without Imported Alloying Elements.** Nandor Hajto. *Ontöde,* v. 5, no. 3, Mar. 1954, p. 49-58.

Alloying of iron with manganese, aluminum and silicon as substitutes for nickel. Structures, properties and applications. Tables, charts, micrographs. 15 ref. (E25, B22, CI)

337-E. (Hungarian.) **Silicones and Their Application in the Foundry.** Ivan Lipovecz. *Ontöde,* v. 5, no. 3, Mar. 1954, p. 58-62.

Use and production of organic silicon compounds as bonding agents for molds. (E18)

338-E. (Russian.) **Experimental Manufacture of Spheroidal Graphite Chilled Iron Rolls in Hungary.** B. Korös. *Acta Technica Academiae Scientiarum Hungaricae,* v. 8, nos. 1-2, 1954, p. 36-66 + 4 plates.

Four series of tests on production methods. Micrographs, tables, diagram, graphs. 37 ref. (E11, E25, CI)

339-E. (Book.) **Densening and Chilling in Foundry Works.** Edward Longden. Griffin & Co. Ltd., 42, Drury Lane, London, W. C. 2. 28s.

Practical application of factors involved in chilling and making sound castings. Metallurgical considerations, and effects of mold materials on density in various directions. (E25)

340-E. (Book.) **Investment Casting of SAE 1040 Steel.** 22 p. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. (P11119) $0.50.

Better castings in commercial carbon steels with an improved master pattern and novel methods of pouring bismuth mold halves and joining expendable wax patterns. (E15, CI)

341-E. (Book—Italian.) **Short History of the Foundry. (Breve Storia della Fonderia).** Guglielmo Somigli. 83 p. Il. Centro Fonderia, A. I. M. 16, via della Moscova, Milan, Italy. 1000 lire.

Evolution of foundry practice from a theoretical and practical viewpoint. (E general, A2)

F

Primary Mechanical Working

165-F. Vickers-Armstrongs Viscount. II. Basic Processes: Frame Rolling; Taper and Circular Rolling; Rotary Forming; Stinger Piercing. *Aircraft Production,* v. 16, Apr. 1954, p. 139-146.

Methods of shaping and manipulation. Photographs, diagram. (F23, G11)

166-F. Beryllium. P. L. Lowenstein, A. R. Kaufman and S. V. Arnold. *American Machinist,* v. 98, Apr. 12, 1954, p. 203-206.

Extrusion, rolling and forging methods. Diagrams, photograph. (F24, F23, F22, Be)

167-F. Beryllium. Shields M. Bishop. *American Machinist,* v. 98, Apr. 12, 1954, p. 207-208.

Rolling and forging methods. Photographs. (F23, F22, Be)

168-F. The Theory and Practice of Wire Drawing. I. Some Researches in Wire Drawing. F. C. Thompson. *Australasian Engineer,* 1954, Feb., p. 42-49.

Considers equation for work done during wiredrawing. Drawing speed, die angle and load, reduction in area, yield stress and temperature reviewed. Graphs, photographs, diagrams, tables. 18 ref. (To be continued.) (F28)

169-F. Electrical Drive for a Planetary Rolling Mill. *Engineer,* v. 197, Mar. 26, 1954, p. 458-459.

Possible to vary the ingoing speed of mill and outgoing speed of strip. Motor-generator set and automatic control gear are installed in specially ventilated room, while mill motors, which are installed in rolling bay itself, are force-ventilated to exclude airborne dust. Photographs, diagram, table. (F23)

170-F. Lubricants for Metal-Working Operations in the Non-Ferrous Metals Industry. *Institute of Metals, Journal,* v. 82, Apr. 1954; *Institute of Metals, Bulletin,* v. 2, Apr. 1954, p. 100-104.

Lubricants for hot working, cold rolling and cold drawing. (F1, G21, EG-a)

171-F. Improved Forging Methods Save Steel, Raise Shell Output. W. G. Patton. *Iron Age,* v. 173, Apr. 8, 1954, p. 145-148.

Uses powerful, vertical all-steel presses in place of conventional pierce-and-upset, horizontal draw bench method. Photographs, diagram. (F22, ST)

172-F. Heavy-Duty Tooling for Cold Extrusion of Steel. *Machinery,* v. 60, Apr. 1954, p. 170-175, 237.

Importance of design, material and finish of tools. Photographs, diagrams, tables. (F24, ST)

173-F. The Manufacture of Small-Diameter and Other Special Precision Tubes. *Machinery (London),* v. 84, Mar. 19, 1954, p. 575-585.

Methods employed in precision tube department, with particular reference to hypodermic needle, capillary, Bourdon, high pressure, thin-wall and multibore types. Photographs, micrograph. (F26)

174-F. Manufacture of Bright Drawn Bars and Conduits. Rolt Hammond. *Mechanical Handling,* v. 41, Apr. 1954, p. 180-186.

Mechanical handling in manufac-

ture of bright-drawn bars and steel conduit tubes for electric wiring up to a maximum diameter of 3 in. Photographs, drawings. (F27, ST)

175-F. A Combination Mill for Experimental Rolling of the "New" Metals. A. I. Nussbaum. *Metal Progress,* v. 65, Apr. 1954, p. 121 + 4 pages.

Combination two and four-high mill developed to furnish research organizations and metallurgical laboratories with low-cost testing apparatus. Table. Photographs. (F23, Ta, Mo, W)

176-F. A High Speed Non-Slip Accumulation Wire-Drawing Machine. N. Davidson. *Wire Industry,* v. 21, Mar. 1954, p. 275, 277, 279.

Quality maintained by increasing existing speeds and more efficiently cooling the wire at each stage. Photographs. (F28)

177-F. (French.) **The "Aptitude to Swaging" of Sheet Metal. II.** Pierre Vauthier. *Métaux, Corrosion-Industries,* v. 29, no. 342, Feb. 1954, p. 57-65.

Relates "P.V.I." test to depth, necking, anisotropy and extension. Diagrams, graphs, tables. (To be continued.) (F25)

178-F. Extruded Rings for Gas Turbines. *Aeroplane,* v. 86, Apr. 2, 1954, p. 401-403.

Fabrication of high-grade stainless steel. Production and design of rings. Photographs, diagrams. (F24, SS)

179-F. The Hot Extrusion of Steel. J. Sejournet. *Engineering,* v. 177, Apr. 9, 1954, p. 463.

Abridged from "The Ugine-Sejournet Process for the Hot Extrusion of Steel", presented at meeting of Iron and Steel Institute and British Section, Société des Ingénieurs Civils de France, Apr. 1954. Method using glass wool as lubricant for plain-carbon and austenitic stainless steels. (F24, ST, SS)

180-F. The Manufacture of Crankshafts by the Continuous Grain Flow Process. G. Cleghorn and I. H. Burnell. *Institute of Marine Engineers, Transactions,* v. 66, Mar. 1954, p. 49-58; disc., p. 58-64.

Method of operation, particulars of furnaces used for heating bars, straightening, inspection and treatment of the crankshaft forging after it is completed and actual test figures obtained from such crankshafts. Diagrams, photographs, table. (F22, ST)

181-F. Flexible Bar Mill Equipment Permits Fast Service, Close Control. W. G. Patton. *Iron Age,* v. 173, Apr. 15, 1954, p. 132-135.

Fully mechanized, efficiently modern semicontinuous bar mill can retain desirable versatility of hand-operated bar mill. Size range of ½ to 4½ in. is probably unique for steel industry. Tables, photographs. (F23, ST)

182-F. Mechanized Sheet and Tinplate Mills. John H. Mort. *Iron & Steel,* v. 27, Apr. 1954, p. 141-144.

Electrical energy consumption. Tables, graphs. (F23, ST)

183-F. Unusual Electric Drive Features Applied to Fairless Processing Lines. E. E. Vonada. *Iron and Steel Engineer,* v. 31, Apr. 1954, p. 114-119.

Drive systems for pickle line, side trim and recoil and shearing lines. Diagrams. (F general, ST)

184-F. The Modern Electric Weld Pipe and Casing Mill. Norbert C. Rubin. *Iron and Steel Engineer,* v. 31, Apr. 1954, p. 120-123; disc., p. 123-124.

Large electric resistance weld pipe mills utilize higher speeds, yields and efficiencies. New installation discussed. Photographs. (F26)

185-F. Control for a Modern Electric Weld Pipe and Casing Mill. C. E. Smith. *Iron and Steel Engineer,* v. 31, Apr. 1954, p. 124-130; disc., p. 130-131.

Electrical controls furnished for a large resistance welding tube mill, mainly controllers for adjustable voltage d.c. drives and weld power source. Photographs, graph, diagrams. (F26)

186-F. New Swedish Mill Designs and Layouts for Medium and Small Sections and Wire Rod. S. Erik M. Norlindh. *Iron and Steel Institute, Journal,* v. 176, Apr. 1954, p. 391-405 + 20 plates.

Development of repeater rolling to a high degree of reliability including breakdown and leader ovals down to 0.2-in. wire rod at final speeds of 4000 ft. per min. Essential new designs allow rolling of small ingots. Diagrams, drawings, photographs. (F23, ST)

187-F. Practical Experience in the Use of Repeaters in a Looping Mill. Hans Wilhelm Riddervold. *Iron and Steel Institute, Journal,* v. 176, Apr. 1954, p. 406-411.

Factors affecting working reliability when rolling with repeaters in 3-high and alternating 2-high mills. Sizes of reductions, guides, and repeaters. Photographs, graph, diagrams. (F23)

188-F. The New Fagersta Wire-Rod Mill. K. E. Pihlblad. *Iron and Steel Institute, Journal,* v. 176, Apr. 1954, p. 411-414.

Layout and operation of wire-rod mill. Methods used to achieve exact roll setting for Leufvén mill stands. Graph, tables, photograph, diagram. (F27)

189-F. Roller-Bearings in Swedish Rolling Mills and the S.K.F. Rolling-Mill Design. Axel Leufvén. *Iron and Steel Institute, Journal,* v. 176, Apr. 1954, p. 415-423 + 3 plates.

Importance of oil-injection method. Modern bearing applications in different types of rolling mills. Preloaded bearing housings and design for wire-rod and cold rolling mills. Drawings, photographs, graph. (F23)

190-F. The Manufacture of Hypodermic Needle Tubing. *Machinery (London),* v. 84, Apr. 2, 1954, p. 679-686.

Manufacture of small diameter and other special types of precision tubes. Procedure subsequent to "pulling to gage" emphasized. Photographs. (F26)

191-F. Modern French Aluminium Foil Production. *Sheet Metal Industries,* v. 31, no. 324, Apr. 1954, p. 313-317.

Methods used at two French plants. Photographs. (F23, Al)

192-F. The Rolling of Metals and Alloys. I. Historical Development of the Rolling Mill. Eustace C. Larke. *Sheet Metal Industries,* v. 31, no. 324, Apr. 1954, p. 325-334, 338.

Concludes historical survey of ordinary-type continuous mills for rolling wide strip. Photographs, diagram. 20 ref. (To be continued.) (F23, A2)

193-F. Metallurgical Requirements of Steels for Cold Extrusion. D. V. Wilson. *Steel Processing,* v. 40, Apr. 1954, p. 215-223, 255.

Phosphate coatings provide a satisfactory basis for lubrication of ferritic steels in severe cold working operations. Primary limitations of process appear to lie in tool materials and tool design rather than in materials extruded. Graphs, photographs, micrographs, tables, diagrams. 15 ref. (F24, ST)

194-F. The Economy of Shaped Wire. Emmett H. Mann. *Wire and Wire Products,* v. 29, Apr. 1954, p. 391-392, 454-456.

Economic advantages and production of shaped wires for use in many fabricating operations. Photographs, table. (F28)

195-F. A Practical Analysis of the Causes of Die Wear in the Dry-Drawing of Ferrous Wires. E. P. Riley-Gledhill. *Wire Industry,* v. 21, Apr. 1954, p. 407 + 5 pages.

Improves die life with proper coatings or lubricants and by alignment of ingoing wire. Tables, diagrams, photograph. (F28)

196-F. (German.) **The Effect of Rolling Speed on Rolling Pressure, Strength Properties, and Strip Thickness in Cold Rolling of Strip Steel.** Joseph Billigmann and Anton Pomp. *Stahl und Eisen,* v. 74, no. 8, Apr. 8, 1954, p. 441-461.

Experiments with five low-carbon openhearth steels indicate that pressure and thickness depend upon rate and lubrication of rolling. Form-change resistance and rise of strip temperature mutually compensate the effect of rolling rate. Tables, graphs. 102 ref. (F23, ST)

197-F. (German.) **Industrial Measurement of Wire Temperature on Multiple Drawing Machines.** Anton Zastera. *Stahl und Eisen,* v. 74, no. 8, Apr. 8, 1954, p. 461-464.

Rapid and trouble-free method of measuring temperatures of wire during drawing operation. Diagrams, tables, graphs. 8 ref. (F28)

198-F. (German.) **Present Status of Hot Working of Cast Iron.** Adalbert Wittmoser. *Zeitschrift für Metallkunde,* v. 45, no. 3, Mar. 1954, p. 127-136.

Shows that with proper methods most types of cast iron may be hot worked. Mechanical properties after treatments. Photographs, table, micrographs, graphs, diagrams. 32 ref. (F general, Q general, CI)

199-F. Alloy Steel, Titanium Successfully Hot Extruded. I. K. A. Wilhelm and G. A. Moudry. *Iron Age,* v. 173, Apr. 29, 1954, p. 98-102.

Studies on extrudability, extrusion temperature, heat treatment, lubricants and die design. Photographs, graph. (F24, Ti, AY)

200-F. Foundation of Drop Hammers. I. E. Katel. *Metal Treatment and Drop Forging,* v. 21, Apr. 1954, p. 161-167. (Translated from *Revue de Métallurgie,* June, 1953.)

Importance of guarding against transmission of tremors; various designs and constructions of foundations. Diagrams, table, photograph. 3 ref. (F22)

201-F. (Hungarian.) **Nomograms for Determination of Power Need of Rolling Trains.** Antal Buza. *Kohaszati Lapok,* v. 9, no. 3, Mar. 10, 1954, p. 115-122.

Reviews construction of linear nomograms of parallel scales. Applies method of reversing rolling trains. Diagrams. (F23)

202-F. (Pamphlet.) **Bibliography on Closed Die Forging.** 15 p. 1953. Loewy Construction Co., Inc., 350 Fifth Ave., New York 1, N. Y.

(F22)

203-F. (Book.) **Fundamentals of the Working of Metals.** G. Sachs. 166 p. 1954. Pergamon Press, Ltd., 242 Marylebone Rd., London, N.W. 1, England.

Intended for students and practical engineers, textbook is concise collection of basic facts of working metals by forging, rolling, drawing and other processes. (F general, G general)

204-F. (Book.) **The Manufacture and Properties of Steel Wire.** Anton Pomp. 358 p. Wire Industry, 33 Furnival St., London, E.C. 4. 84s.

Wiredrawing and its auxiliary processes such as pickling, annealing, and patenting. (F28, ST)

G

Secondary Mechanical Working

232-G. Foam Cooling Clings. James P. Mason and Edward B. Weber. *American Machinist,* v. 98, Apr. 12, 1954, p. 174-176.

Inexpensive foam-creating attachments on standard coolant lines cut splashing and cause coolant to cling to rapidly moving tools and workpieces, adding to tool life and improving work conditions. Photographs, diagram. (G21)

233-G. Carbide Cuts Carbide Chipbreakers. Anderson Ashburn. *American Machinist,* v. 98, Apr. 12, 1954, p. 185-187.

Chipbreaker ledges are cut in single-point carbide tools by electrical-discharge machine. Photographs, diagrams, table. (G17)

234-G. Titanium and Steel Hot-Extruded on Coast. *American Machinist,* v. 98, Apr. 12, 1954, p. 256-257.

Steel extrusions made from 6 3/16-in. diameter billets and titanium extrusions from 5-in. diameter billets at pressures of 3000 psi. Photographs, diagram. (G5, SS, Al, AY, Ti)

235-G. A Review of Metal Spinning. II. *Canadian Metals,* v. 17, Apr. 1954, p. 38, 40, 42.

Reviews literature compiled by technical information service, N.R.C., Ottawa. (G13, Al)

236-G. Automatic Production of Beryllium Copper Parts for Business Machines. *Canadian Metals,* v. 17, Apr. 1954, p. 57-58, 60.

Electrical contacts for accounting equipment are used in quantities that warrant production on automatic machines. Beryllium copper alloy gives desired physical properties and durability. Photographs. (G17, T10, Be, Cu)

237-G. Cutting Oil Dermatitis. *Canadian Metals,* v. 17, Apr. 1954, p. 62.

Cause and prevention among employees using cutting oils as cooling agents. (G21, A7)

238-G. An "A.B.C." of Cold Extrusion of Steel. John Perry. *Canadian Mining and Metallurgical Bulletin,* v. 47, no. 503, Mar. 1954, p. 132-135; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 57, 1954, p. 64-67.

Lubrication, process techniques, tool materials, equipment, steel composition, testing procedures. Diagrams, graphs. (G5, ST)

239-G. Radiator Core Making Plant. *Engineer,* v. 197, Apr. 2, 1954, p. 491-493.

Equipment and operating procedures. Includes tube rolling, tinning, forming, cutting and soldering. Photographs. (G general, L16, K7)

240-G. Economic Factors Must Govern Wheel Selection for Grinding Carbides. F. J. Lennon, Jr. *Industrial Diamond Review,* v. 14, Mar. 1954, p. 53-56.

Data pertaining to wheel cost per cubic inch of carbide ground means very little unless comparison is based on identical operations. Guide for wheel selection. Photographs. (G18)

241-G. High-Speed Hobbing Results in Important Savings. *Machinery,* v. 60, Apr. 1954, p. 178-183.

Remarkable reductions in production time are being achieved, hob life is lengthened, and where subsequent finishing of the gear teeth is required, feed rates used can be boosted to expedite operation. Photographs, graph. (G17)

242-G. Present-Day Techniques of Spinning Aluminum. J. R. Young. *Machinery,* v. 60, Apr. 1954, p. 194-201.

Spinning is finding widespread application in the production of sheet metal parts for which other methods of fabrication are not feasible. Low cost of tooling is dominant factor in choice of spinning as against drawing or forming as a production method. Photographs, diagrams, table. (G13, Al)

243-G. Carbides—Advantages and Limitations. C. H. Good. *Machinery,* v. 60, Apr. 1954, p. 202-205.

Applications for carbides, equipment and techniques for their use. Photographs, graph, micrographs. (G17, SG-j)

244-G. Electromechanical Spot-Drilling Reduces Costs. Raymond H. Spiotta. *Machinery,* v. 60, Apr. 1954, p. 229-232.

Equipment, techniques and operating characteristics. Photographs, diagram, chart. (G17)

245-G. High-Speed Broaching of Motor-Car Engine Castings. J. J. Wetzel. *Machinery (London),* v. 84, Mar. 19, 1954, p. 598-603.

Parts for V-8 engine are produced rapidly and economically by use of large horizontal broaching machines equipped with planer-type, inserted, tungsten carbide-tipped broaching tools, and operating at speeds up to 200 ft. per min. Photographs, diagrams. (G17)

246-G. The Production of Plastic Moulded Commutators. *Machinery (London),* v. 84, Mar. 26, 1954, p. 627-636.

Impact extrusion equipment and techniques. Photographs, diagram. (G5, Cu)

247-G. New Extrusion Techniques Developed. H. Albers, G. Krause and A. Greensite. *Mechanical Engineering,* v. 76, Apr. 1954, p. 343-345.

Extrusion presses utilized to produce longitudinally tapered, step and multi-shouldered extrusions, as well as combination die forgings and extrusions. Diagrams. 8 ref. (G5, F22)

248-G. Extruding Thin-Walled Tubing. *Metal Industry,* v. 84, Mar. 19, 1954, p. 225-226.

Impact extrusion process permits rapid production of seamless aluminum tubes with scratch-free surfaces and walls that are 0.0065 in. thick within tolerances of ± 0.0005 in. Photographs. (G5, Al)

249-G. Impact Extrusions. Bernard F. Wade. *Product Engineering,* v. 25, Apr. 1954, p. 173-175.

Typical examples for different classes of impact extruded shapes. Table, photographs. (G5, Al)

250-G. How to Cut Those Metal-Working Blues. R. E. Crawford. *SAE Journal,* v. 62, Apr. 1954, p. 64-65.

Premature failure of carbide tools, tool mounting, refrigeration of cutting oils and when to replace tools. (G17, G21)

251-G. Experiences Pooled on Five Machining Problems. H. W. Ingalls. *SAE Journal,* v. 62, Apr. 1954, p. 66-68.

Considers machining impellers and integrally stiffened skins, cutter design, high tensile steels and titanium experiences. (G17, ST, Ti)

252-G. Spinning Operations Can Reduce Material Costs. *Screw Machine Engineering,* v. 15, Apr. 1954, p. 49-52.

Primary factor considered in using tubing is that cost is figured per linear foot rather than per pound. Use of tubing eliminates drilling operations. Drills can be replaced by rather inexpensive boring tools. Drawings. (G13)

253-G. New Machines and Methods. Walter P. Hill. *Tooling and Production,* v. 20, Apr. 1954, p. 47-50.

Production machines of the future will not be standard machines but will be specially designed for specific operations. Photographs. (G17)

254-G. The Evolution of a New American Machine Tool. Gordon Stephenson. *Tooling and Production,* v. 20, Apr. 1954, p. 51-53, 194.

New forming machine has ability to maintain close tolerances and power to cope with tough new alloys. Photographs. (G17)

255-G. Cemented Carbides Perform Better on Better Machines. Watson N. Nordquist. *Tooling and Production,* v. 20, Apr. 1954, p. 72-77.

To take advantage of present carbide tool performance, rigid and sturdy machine tools of 1954 should be considered. Photographs, table. (G17)

256-G. Forming Sections With Form Die Quenching. Joseph S. Corral. *Western Machinery and Steel World,* v. 45, Mar. 1954, p. 70-74.

Process combining forming and heat treating in one operation produces extremely accurate contours in high-strength aluminum alloy sheet; eliminates warpage and distortion normally occurring during water quenching. Photographs, drawings. (G general, J26, Al)

257-G. (French.) **Relation Between the Phenomenon of the Built-Up Edge in the Cutting of Metals and Hot Brittleness.** Paul Bastien and Michel Weisz. *Revue de métallurgie,* v. 51, no. 2, Feb. 1954, p. 73-84.

Measurement of cutting force, temperature and tensile tests at elevated temperatures. Machining tests on chromium-molybdenum steel used with three structures. Conditions under which various types of chip are obtained. Tables, micrographs, diagrams, graphs. 6 ref. (G17, Q23, AY)

258-G. (German.) **Research on Flame-Cutting With Block-Type Nozzles.** E. Zorn. *Schweissen und Schneiden,* v. 6, no. 3, Mar. 1954, p. 105-108.

Comparison with efficiency of two-piece nozzles. Graphs, diagrams, photograph. (G22)

259-G. (Russian.) **Hardening of Shafts by Surface Cold Hardening.** I. V. Kudriavtsev and S. I. Iatskevich. *Vestnik Mashinostroeniia,* v. 33, no. 10, Oct. 1953, p. 68-71.

Experimental results on adjusting ring seats. Increased fatigue strength. Graphs, photographs, micrographs, table, diagrams. 3 ref. (G23, Q7, J2)

260-G. (Russian.) **Increased Productivity by Anodic-Mechanical Tool Dressing.** A. I. Petrov and A. V. Glazkov. *Vestnik Machinostroeniia,* v. 33, no. 10, Oct. 1953, p. 75-79.

New process of dressing hard alloy tools. Advantages and disadvantages. Diagrams, table, graph. (G18, TS)

261-G. (Swedish.) **Hobbed Cavities for Compression and Injection Molds.** C. Ostman. *Svenska Plast Föreningen Tekniska Meddelanden,* v. 9, no. 3, Feb. 1954, 5 p.

Types of cavities suitable for hobbing, details of process. Diagrams. (G17, TS)

262-G. (Swedish.) **Some Factors Influencing Cold Hobbing of Molds for Plastics.** G. Folke. *Svenska Plast Föreningen Tekniska Meddelanden,* v. 9, no. 4, Feb. 1954, 11 p.

Effects of cold working on microstructure and flow properties. Special emphasis on low-carbon 4% chromium-molybdenum steel. Tables, graphs, micrographs, photographs, diagrams. 6 ref.
(G17, AY, TS)

263-G. Cold Forming Has Many Advantages for Making Automotive Parts. Joseph Geschelin. *Automotive Industries,* v. 110, Apr. 15, 1954, p. 34 + 8 pages.

Major advantages. Photographs, micrographs, drawing, diagrams.
(G general)

264-G. Grinding Operations in the Cleaning Room. Glenn S. Eisaman. *Foundry,* v. 82, May 1954, p. 384 + 4 pages.

Equipment and techniques. Photograph. (To be continued.) (G18)

265-G. How to Eliminate Vibration, Torque and Bounce in Weld Grinding. *Industry & Welding,* v. 27, May 1954, p. 74-76, 78-79.

New unit makes it possible to apply full face contact of raised hub disk wheels, abrasive disks, and cup wheels without objectionable bounce and torque. It increases speed of operation and quality of work. Photographs, diagram. (G18)

266-G. Precision Stampings. Progressive Die Setups Permit High Output. J. I. Feldborg. *Iron Age,* v. 173, Apr. 22, 1954, p. 170-173.

Precision and high production achieved by a 350-ton, five-station progressive die setup. Setup requires minimum time for die and coil changes. Photographs, diagram. (G3)

267-G. Automatics Can Show Profits on Short Runs. Dale Stoneman. *Iron Age,* v. 173, Apr. 22, 1954, p. 173-176.

New machines feature speed, accuracy, low setup time, make small lot production profitable and eliminate human factor. Puts machining on pushbutton basis. Photographs. (G17)

268-G. Cutting Fluids. Proper Selection Leads to Better Machining. James McElgin. *Iron Age,* v. 173, Apr. 22, 1954, p. 177-179.

With new hard and tough alloys, cutting fluids have increased in importance. They reduce friction, improve work quality, save on tools and dissipate heat. Graphs, photograph. (G21)

269-G. New Techniques Expand Uses for Plastic Tooling. W. G. Patton. *Iron Age,* v. 173, Apr. 22, 1954, p. 180-183.

Accurate, highly serviceable plastic checking and locating fixtures are now made in 24 hr. with weight savings of 50% or more. Photographs. (G17)

270-G. High Speed Machining Improves Quality, Cuts Costs. R. B. Brooks. *Iron Age,* v. 173, Apr. 22, 1954, p. 184-186.

Better quality at lower cost favors high over low-speed machining. Tool life equals and surpasses that obtained at slower speeds. Machines must be rigid. Photographs, diagram. (G17)

271-G. Threading With Carbon Dioxide Coolant. *Machinery (London),* v. 84, Apr. 2, 1954, p. 695-698.

Cooling method used on high-tensile steels. Advantages and possibilities. Photographs, diagram.
(G21, ST)

272-G. Time Microscopy. *Machinery (London),* v. 84, Apr. 2, 1954, p. 701-704.

Mechanism of slow motion camera frequently employed to advantage in investigation of such phenomena as cutting actions of tools and cutters of a wide variety of forms. Photographs. (G17)

273-G. Trouble-Shooting in the Press Room. Federico Strasser. *Modern Industrial Press,* v. 16, Apr. 1954, p. 56, 58.

How to avoid sticking of small slugs in die plates. Diagrams. (G1)

274-G. The Hydroform as a Production Tool. Lester F. Spencer. *Steel Processing,* v. 40, Apr. 1954, p. 243-248.

Essential difference between hydroform and the conventional press used for draw forming is in tooling. Economic advantages and operating procedures. Photographs, table, diagrams. 5 ref. (G8)

275-G. Deep Drawing of 17% Chromium Iron. W. D. Pritchard. *Sheet Metal Industries,* v. 31, no. 324, Apr. 1954, p. 300.

Details of new controlled grain size aluminum bronze die material.
(G4, Cu, SS)

276-G. Dies for Bending Operations. Federico Strasser. *Sheet Metal Industries,* v. 31, no. 324, Apr. 1954, p. 339-340.

Design considerations for various 90° forming dies. Diagrams. (G6)

277-G. The Right Chip Breaker. *Steel,* v. 134, Apr. 26, 1954, p. 98-101.

Longer tool life, better machining tolerances and surfaces, easier chip disposal and safer machine operation are benefits of good breaker design. Tips on procedure. Graphs, tables, diagrams. (G17)

278-G. Tips to Lower Tooling Costs. A. S. Hecker. *Steel,* v. 134, Apr. 19, 1954, p. 138-139.

Responsibility for producing finer tools at lower prices rests with process planner and tool designer. Nine tips to aid intelligent planning.
(G17)

279-G. Peening Investigations. *Welding Journal,* v. 33, Apr. 1954, p. 206S-208S.

Interpretive report by the Peening Committee, Welding Research Council, based upon two reports issued by the American Bureau of Shipping Laboratory and a report issued by the Naval Research Laboratory. 6 ref. (G23)

280-G. New Deep Drawn Aluminum Machine Stock Provides Peak Machining Production. *Western Metals,* v. 12, Apr. 1954, p. 56-57.

Deep drawing material under extremely high pressure works aluminum rod and bar in such a manner that completely new metallurgical structure of metal is obtained. Photographs. (G17, G4, Al)

281-G. (French.) **Tool Shaping of Thin Sheet Pieces.** R. Dupas. *Métallurgie et la construction mécanique,* v. 86, no. 3, Mar. 1954, p. 179, 181-183.

Production by stamping, perforating, flanging, punching and cambering. Diagrams. (G3, G2)

282-G. (French.) **Principles of Deep Drawing.** B. Wassilieff. *Métallurgie et la construction mécanique,* v. 86, no. 3, Mar. 1954, p. 185-186, 189, 191.

Influence of outer radius and clearance of die and punch, diameter of mold, mold clamp and redrawing. Diagrams, graph. 3 ref.
(G4)

283-G. (French.) **Modern Oxygen-Cutting Material.** L. Bothorel. *Métallurgie et la construction mécanique,* v. 86, no. 3, Mar. 1954, p. 193 + 6 pages.

Use of high-pressure monoblock and low-pressure heads for blow torches, gouging heads and oxygen cutting with flux. Electronic control and different guiding methods. Diagrams, photographs, table. (G22)

284-G. (German and French.) **The Suitability of Fuel Gases for Oxygen Cutting.** Georg Kunz. *Zeitschrift für Schweisstechnik,* v. 44, no. 4, Apr. 1954, p. 83-86.

Shows acetylene to be most economical. Tables, graphs. (G22)

285-G. (Russian.) **Selection of Rational Initial Length of Rolled-Section Steel for Stamping.** V. L. Raskind. *Vestnik Mashinostroeniia,* v. 34, no. 3, Mar. 1954, p. 49-53.

Cost-reducing mathematical approach in determining most expedient lengths. Tables, graph, diagrams. (G3, ST)

286-G. Modern Broaching Technique. *Mechanical World and Engineering Record,* v. 134, Apr. 1954, p. 155-157.

Modern technique in metal cutting with various types of broaches. Diagrams, tables. (G17)

287-G. Machining and Installing Oil-Impregnated Bearings. *Metal-Working,* v. 10, May 1954, p. 14-15.

Bronze bearing metal machined best with standard tungsten-carbide tools. Precautions listed. Diagrams, table. (G17, Cu)

288-G. Applying Safe Practices to Grinding and Polishing Magnesium Alloys. *Metal-Working,* v. 10, May 1954, p. 18-19.

Grinding hazards, wheel selection, safety, polishing and dust collection. Table, diagrams.
(G18, A7, L10, Mg)

289-G. How to Machine Titanium. *Steel,* v. 134, May 3, 1954, p. 96-98.

Chief problem is short tool life cause abrasiveness, galling and high tool-tip temperatures. Graphs.
(G17, Ti)

H Powder Metallurgy

66-H. Centrifugal Compacting. A New Method for Producing Metal Powder Parts. Robert C. Lindberg. *Materials & Methods,* v. 39, Apr. 1954, p. 86-87.

Economies and uniform density in large parts made with heavy powders. Application of method to form tungsten carbide bullet cores. Photographs. (H14)

67-H. Infiltration Improves Properties of Metal Powder Parts. John L. Everhart. *Materials & Methods,* v. 39, Apr. 1954, p. 88-90.

Advantages, applications and techniques of process. Photographs, table, graph. 7 ref. (H16)

68-H. Metal Supplies and Powder Metallurgy To-Morrow. H. W. Greenwood. *Metallurgia,* v. 49, no. 293, Mar. 1954, p. 135-136.

Application of hydro-metallurgical and ion exchange methods producing powders from low grade metal ores. 8 ref.
(H10, Ni, Co, Cu, U)

69-H. Fabrication of Beryllium by Powder Metallurgy. Wallace W. Beaver. *Metal Progress,* v. 65, Apr. 1954, p. 92 + 9 pages.

Condensed from paper presented at Beryllium Symposium ASM Meeting, Boston, Mar. 1954. Powdering and reconsolidation practices. Mechanical and physical properties of blanks and semifinished products. Micrographs, graphs, tables, photographs.
(H general, Q general, P general, Be)

70-H. Metal Powders for Brake and Clutch Work Surfaces. L. P. Kane.

Precision Metal Molding, v. 12, Apr. 1954, p. 37-38, 123.
Accurate control of friction properties is useful attribute of powdered metal components. Photographs. (H11, Q9)

71-H. High Propertied Powdered Iron Parts for Motorcycles and Bicycles. Gerhard Zapf. *Precision Metal Molding,* v. 12, Apr. 1954, p. 40-42, 125.
Using electrolytic iron powder as a raw material and copper as an alloying component, Husqvarna, Sweden, now produces three distinct qualities of sintered steels, giving different physical properties. Photographs, tables. (H general, Fe, Cu)

72-H. Brazing: It's One of the Uses for Infiltration of Powder Parts. Clyde C. Clark. *Precision Metal Molding,* v. 12, Apr. 1954, p. 57-58, 126.
Infiltration consists of use of a liquid phase of lower melting material to fill pores of a skeleton or matrix of higher melting material. Properties and uses presented. Micrographs. (H16)

73-H. Powder Metallurgy Directory. *Precision Metal Molding,* v. 12, Apr. 1954, p. 59 + 6 pages.
Reference tables of characteristics of metal powders, and of parts produced from metal powders, indicate nominal or typical properties of these materials. Tables.
(H11, Cu, Fe)

74-H. Industry Takes to Powder. Thomas A. Kindre. *Steelways,* v. 10, Apr. 1954, p. 12-15.
Old metalworking method is used to turn out parts for automobiles and hundreds of other mechanical devices. Powder metallurgy has proved a cost-cutting boon for many manufacturers. Photographs, drawings. (H general)

75-H. (French.) **Static and Dynamic Measurement of the Elastic Modulus of Sintered Materials.** J. Barducci and R. Cabarat. *Revue de métallurgie,* v. 51, no. 3, Mar. 1954, p. 149-153.
Measurements under very low stress by wire resistance straingages and by high-frequency vibration agree for most materials. Tables, graph, diagram. 3 ref.
(H11, Q21, Cu, Sn)

76-H. (German.) **Technical Sintering Materials From the System Fe-Cu.** Gerhard Zapf. *Stahl und Eisen,* v. 74, no. 6, Mar. 11, 1954, p. 338-347.
Strength properties approximate those of rolled steel. Tables, photographs, diagram, graphs. 21 ref.
(H15, Q23, Cu, Fe)

77-H. Single, Solid Pieces of Cemented Carbide Produced on Hot Press. *Modern Industrial Press,* v. 16, Apr. 1954, p. 32.
Operation of press for production of single, solid pieces up to 4000 lb. Photographs. (H14, C-n)

78-H. Pore-Size Distribution of Porous Iron. P. Swietering and H. L. T. Koks. *Nature,* v. 173, Apr. 10, 1954, p. 683-684.
Penetration of mercury under pressures up to about 1000 atmospheres is especially suited for determination of pore sizes greater than 100 A. Tables, graphs. 3 ref.
(H11, Fe)

79-H. The Structure of Carbonyl Iron. A. Taylor. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 202-217 + 3 plates; disc., p. 217.
X-ray investigation of various powders. Crystallite size and lattice stresses in E-type and C-type powders measured. Graphs, micrographs, tables, radiographs.
(H11, M26, Fe)

80-H. 50-50 Carbonyl Nickel-Iron Powders. C. E. Richards and D. C. Shotton. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 247-252.
Examination by magnetic and X-ray diffraction methods shows that it is unnecessary to exceed 500 to 600° C. to complete alloying of the powder. Table, graph.
(H12, P16, Ni, Fe)

81-H. (German.) **Investigation of Sintering Phenomena by Using Radioisotopes.** Horst Schreiner and Gottfried Glawitsch. *Zeitschrift für Metallkunde,* v. 45, no. 3, Mar. 1954, p. 102-108.
Methods, equipment and application to difficult powder metallurgical problems. Diagram, table, graphs. 11 ref.
(H15, S19, Th, Cu, Fe, Ni)

82-H. (German.) **Anisotropy of Electric Conductivity in Some Powder Metal Contact Materials.** Albert Keil and Carl-Ludwig Meyer. *Zeitschrift für Metallkunde,* v. 45, no. 3, Mar. 1954, p. 119-122.
Effect of composition, method of preparation and other factors on silver-graphite mixtures. Diagrams, micrographs. 5 ref. (H11, P15, Ag)

83-H. (German.) **Kinetics of Sintering.** Johannes Gerlach and Ottmar Knacke. *Zeitschrift für Metallkunde,* v. 45, no. 3, Mar. 1954, p. 123-127.
Investigation by press welding of cadmium blanks. Influence of pressure and temperature on strength of the weld. Analysis of welding process. Diagram, graphs, micrograph. 27 ref. (H15, K5, Cd)

84-H. (Book—German.) **Plansee Report for Powder Metallurgy. (Planseeberichte fur Pulvermetallurgie).** v. I. no. 4. Metro-Cutanit, Ltd., Grappenhall, Warrington Lancs, England.
Three articles include gas adsorption in powdered and sintered products; properties of sintered nickel-copper alloys; summary of developments in methods of melting.
(H general, C general, Ti, Zr, Hf, V, Ta, Cr, Mo, W)

J Heat Treatment

143-J. Estimation and Influence of the Gaseous Elements in Cast Iron. L. W. L. Smith, B. B. Bach and J. V. Dawson. *Foundry Trade Journal,* v. 96, Mar. 18, 1954, p. 303-306; disc., p. 306-309.
Neutralizing effect of aluminum on carbide stabilizing effect of nitrogen during second stage anneal was shown by heat treatment of specimens to which 0.1% aluminum addition was made prior to nitrogen treatment. Micrographs, graphs, table. (J23, CI, Al)

144-J. Simple Test Measures Quenching Power of Salt Baths. R. F. Harvey. *Iron Age,* v. 173, Apr. 8, 1954, p. 154-157.
Eccentric hardenability test specimen is basis of new method for determining effects of agitation on characteristics of hot salt baths. Photograph, graphs, diagrams. 7 ref. (J2, AY)

145-J. Shallow Case-Hardening by a High-Intensity Induction Technique. D. S. Simkins. *Machinery (London),* v. 84, Mar. 26, 1954, p. 650-652.
Includes photographs.
(J28, CI, AY, CN)

146-J. Vacuum Heat-Treatment. W. D. Bennett. *Metal Industry,* v. 84, Mar. 26, 1954, p. 245-246.
Furnace for annealing polished metallographic specimens. Diagram, graph. 2 ref. (J23)

147-J. Hardenability Bands for Boron Steels. *Metal Progress,* v. 65, Apr. 1954, p. 112B.
Data sheet gives graphical results of various compositions. Graphs.
(J26, AY)

148-J. Method for Improving Temperature Uniformity in Furnaces. Otto Lutherer and Richard J. Reed. *Metal Progress,* v. 65, Apr. 1954, p. 113-120.
Location of burners relative to load being heated is very important. Addition of large amounts of excess air through burners may improve the temperature uniformity. Graphs, tables, diagram, photographs.
(J general)

149-J. Notes on Producing Hardened Parts. A. Ironside. *SAE Journal,* v. 62, Apr. 1954, p. 76-77.
Heat treatment of rear axle shafts, carburized gears and bolts.
(J general, ST)

150-J. Vapors Cause Distortion in Quenching. Frank M. Aldridge. *Tooling and Production,* v. 20, Apr. 1954, p. 62-63, 191.
Experiments show distortion and cracking of steel parts during quenching are due to vapor phase rather than speed and temperature of quenching medium. Drawings, graph. (J26, ST)

151-J. (French.) **Flash Annealing. Fine Grain and Malleability.** *Revue de l'Aluminium,* v. 31, no. 207, Feb. 1954, p. 52-54.
Tunnel-type electric furnaces permit rapid heating and cooling of aluminum and light alloys. Photographs. (J23, Al)

152-J. (French.) **Contribution to the Study of Certain Factors Involved in the Induction Hardening of Surfaces.** Gilbert Remy. *Revue de métallurgie,* v. 51, no. 2, Feb. 1954, p. 85-100; disc., p. 100.
Surface hardening results in special conditions of austenization. Conditions depend on power, duration of heating and microstructure of steel. Micrographs, graphs, tables, photographs. (J28, J2, ST)

153-J. (French.) **Design, Manufacture, and Behavior of Flame-Hardened Gears.** H. W. Grönegress. *Revue de métallurgie,* v. 51, no. 3, Mar. 1954, p. 165-172.
Methods, effect on resistance to wear, fracture and fatigue, formula for design and results of various comparative tests. Tables, graphs, diagrams, photographs.
(J2, Q general, AY)

154-J. (German.) **Standardization of Aluminum for Conductors.** A. Loeschmann. *Aluminium,* v. 30, no. 3, Mar. 1954, p. 95-98.
High-purity aluminum containing equal amounts of copper and zinc but with varied silicon and iron content were subjected to various heat treatments. Physical and mechanical properties. Tables, graphs.
(J general, P general, Q general, T1, Al)

155-J. (Russian.) **Super Short Time High-Temperature Heating in Heat Treatment of Hardened or Mechanically Work-Hardened Metals.** O. L. Bendryshev. *Vestnik Mashinostroeniia,* v. 33, no. 10, Oct. 1953, p. 45-52.
Experiments determine possibility of eliminating mechanical cold hardening. Graphs, micrographs. 9 ref.
(J26)

156-J. (Russian.) **Isothermal Hardening of High Speed Cutting Steel.** Iu. A. Geller and S. D. Brik. *Vestnik Mashinostroeniia,* v. 33, no. 10, Oct. 1953, p. 52-56.

Recommends 200 to 300° C. with holding time of 20 to 60 min. Graphs, micrograph. 4 ref. (J26, TS)

157-J. (Russian.) **Hardening of Journals of Crankshafts by Heating With Oxy-Acetylene Flame.** M. B. Shapiro and V. V. Bogdanov. *Vestnik Mashinostroeniia,* v. 33, no. 10, Oct. 1953, p. 56-58.

Good results on compressor shafts for wear prevention. Diagrams, graph. (J2)

158-J. (Swedish.) **Proposed Calculating Values for Heat Resisting Steels Above 350° C.** Cyrill Schaub. *Jernkontorets Annaler,* v. 138, no. 2, 1954, p. 53-80.

Limits of analysis, heat treatment and highest application temperatures for various steels. Graphs, tables. 29 ref. (J general, Q general, SS)

159-J. Designing and Operating a Heat Treating Department. Richard W. Wilson. *American Foundryman,* v. 25, May 1954, p. 102-106. (AFS Convention Preprint no. 54-41.)

Installation designed to handle annealing of low-alloy cast gears, hardening and tempering of carbon and low-alloy steel castings, and stress-relieving of certain gray iron castings. Graph, diagrams, photographs. 2 ref. (J general, CI)

160-J. Some Metallurgical Variables Affecting Quench Cracking Susceptibility of Hollow Alloy Steel Cylinders. C. F. Sawyer and C. C. Busby. *American Society for Metals, Transactions,* v. 46, 1954, p. 100-112.

Effects of austenitizing temperature, normalizing prior to heat treatment, temperature to which quenched, cracking susceptibility of material at different positions in a forged ingot and chemical composition of steel. Tables, graphs. 3 ref. (J26, AY)

161-J. Surface Hardening of Titanium by Carburizing and Induction Heat Treatment. A. J. Griest, P. E. Moorhead, P. D. Frost and J. H. Jackson. *American Society for Metals, Transactions,* v. 46, 1954, p. 257-275; disc., p. 275-276.

Good wear resistance obtained in laboratory tests on specimens carburized in propane-argon gas mixtures. Thin cases (0.0002 in.) of TiC appeared to have best adherence and wear resistance. Graphs, micrographs, tables, photographs, diagram. 7 ref. (J28, Ti)

162-J. Effect of Carbon and Boron on the Hardenability of a Case-Carburized Steel. R. A. Grange and J. B. Mitchell. *American Society for Metals, Transactions,* v. 46, 1954, p. 446-474; disc., p. 474-482.

Matched pair of 2% manganese steels, one with and one without boron, were carburized and their hardenability measured throughout case and in core by end-quench method. Tables, graphs, micrographs. 14 ref. (J28, ST)

163-J. Heat Transfer to Aluminum. I. Kirtland Marsh. *Industrial Heating,* v. 21, Apr. 1954, p. 658 + 6 pages.

Information for furnace manufacturers in design and construction of furnaces for heating aluminum. Equally valuable to fabricators of aluminum by giving a better understanding of operating characteristics of furnaces when heating various types and classes of products. Photograph, graph, table. 4 ref. (To be continued.) (J general, P11, Al)

164-J. Ultra-Modern Heat Treating Facilities at New Plant of Metallurgical, Inc. *Industrial Heating,* v. 21, Apr. 1954, p. 680 + 6 pages.

Layout of new plant. Operation of furnaces and facilities. Photographs. (J general)

165-J. High Pressure Nitriding for the Heat Treater. R. L. Chenault and G. E. Mohnkern. *Metal Treating,* v. 5, Mar.-Apr. 1954, p. 2-5, 36-37.

Outstanding advantage of nitriding under pressure is that operating temperature and pressure existing during this process causes inactive nitrogen and hydrogen to unite to form ammonia instead of being vented as in conventional methods. Tables, graphs, micrographs, diagrams. 10 ref. (J28)

166-J. Heat Treatment in the Production of Magnets. *Metal Treating,* v. 5, Mar.-Apr. 1954, p. 8-9.

Proper heat treating produces high-cobalt "directionalized" Alnicos, most powerful magnets commercially known today. Photographs. (J general, SG-n)

167-J. Annealing and Patenting With Salt Baths. L. B. Rousseau. *Wire and Wire Products,* v. 29, Apr. 1954, p. 399-400.

Improvements in salt bath furnaces increase utility and variety of applications in wire industry. Photographs. (J2, J23, J25, ST)

168-J. (Russian.) **Optimum Steel Hardening Temperatures Using High Speed Electrical Heating.** V. M. Zalkin. *Stanki i Instrument,* v. 25, no. 1, Jan. 1954, p. 16-17.

Tests made on structural and tool steels using line-frequency current. Optimum temperature for all steels is 1000° C. or slightly below. Graphs, table. 4 ref. (J2, ST)

169-J. (Russian.) **Decarburization of Steel in Direct Fired Furnaces.** V. F. Kopytov, G. F. Kopytova and P. V. Sorokin. *Vestnik Mashinostroeniia,* v. 34, no. 3, Mar. 1954, p. 36-40.

Tests of ball-bearing steel in atmosphere of city gas at various heating and soaking-time cycles. Recommends faster heat treating processes for steel. Tables, graph, diagrams, micrographs. 1 ref. (J28, ST)

170-J. High Quality Gears Require Precise Heat Treating. John T. Mitchell and Russell Buyea. *Steel Processing,* v. 40, Apr. 1954, p. 249-252.

Production heat treating gears on a large scale involves processing in two distinct phases. Method used at a particular plant described. Photographs. (J general, ST)

171-J. Gear Teeth in Welded Segments Induction Hardened and Tempered. H. J. Boll. *Metal Treating,* v. 5, Mar.-Apr. 1954, p. 6-7, 14.

Procedure used in hardening one tooth at a time. Photographs. (J2)

172-J. Presidential Address. Quenching. George Parkin. *Birmingham Metallurgical Society, Journal,* v. 33, Dec. 1953, p. 143-154.

Mechanism, factors effecting cooling rates, media and variations in practice. (J26, J2, ST)

173-J. Heat-Treatment in Steam. B. R. Swann. *Metal Treatment and Drop Forging,* v. 21, Apr. 1954, p. 168-172.

Tempering, annealing and stress-relieving of metals in steam atmosphere. Method offers certain advantages for treatments between 280 and 625° C. for ferrous metals and 200 and 625° C. for nonferrous metals. Photographs, table. (J29, J23, J1)

174-J. A Look at Custom Heat Treating. *Steel,* v. 134, May 3, 1954, p. 100-102.

Equipment, plant layout and operating procedures. Diagram, photographs. (J general)

175-J. (German.) **Determining Depth of Hardness of Case-Hardened Steels.** Herbert Müller. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 3-4, Mar.-Apr. 1954, p. 125-131; disc., p. 131-135.

Critical investigation of fracture structure, macro and microscopic examination of polished specimens, scratch test and hardness-depth curve. Tables, graphs, micrographs. 10 ref. (J28, ST)

176-J. (German.) **The Temperature Dependence of Decarburization of Steel by Hydrogen.** Kurt Lücke. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 3-4, Mar.-Apr. 1954, p. 181-185.

Experimental and mathematical determination on alpha and gamma iron. Time factor established by tests on carbonyl iron wire. Graphs. (J28, ST)

177-J. (German.) **Economizing in Alloying Elements for Steel by Suitable Heat Treating.** H. Kubisch and H. Tauscher. *Metallurgie und Giesserei Technik,* v. 4, no. 3, Mar. 1954, p. 107-109. (Condensed from *Maschinenbautechnik,* v. 3, no. 1, 1954, p. 5-12; no. 2, 1954, p. 69-74.)

High-temperature bath and isothermal hardening with intermediate stage annealing, surface hardening, bath nitriding, high-temperature phosphating, hot-water treatment of tools and surface diffusion of alloying elements. (J23, J28, L14, N1, ST)

178-J. (Pamphlet.) **Recommended Practice for Post Weld Heat Treatment of Austenitic Weldments.** 1953. American Welding Society, 33 W. 39th St., New York 18, N. Y. $0.50.

Considerations necessary to determine whether, for a given application, stress-relief should be used, and if so, at what time and temperature. (J1, K general)

179-J. (Book.) **Induction and Dielectric Heating.** J. Wesley Cable. 620 p. 1954. Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y. $12.50.

Divided into major sections, dealing with induction and dielectric heating respectively, book contains sufficient theory to enable reader to understand fully basic phenomena applicable to both methods. (J2)

K

Joining

308-K. Fusion Welding Titanium. Francis H. Stevenson. *Aero Digest,* v. 68, Apr. 1954, p. 60, 62, 64.

Successful welding with tensile strength range from 70,000 to 100,000 psi. and a minimum 15% elongation in 2-in. gage length. Welds are made by inert-gas shielded tungsten-arc process with and without filler materials. Photographs, tables. (K1, Ti)

309-K. Welders Go Sky-High. J. G. Church. *Canadian Metals,* v. 17, Apr. 1954, p. 44, 46, 48.

Application of welding to construction of refinery equipment. Photographs. (K general)

310-K. Powdered Iron Enters Into Electrode Designs. *Canadian Metals,* v. 17, Apr. 1954, p. 50, 52-53.

Heavily coated electrodes containing large quantities of powdered metal in their coatings obtain increased welding speeds of the order of 50%, with appearance in smoothness and freedom from spatter almost equal to that obtained with automatic welding. Photographs, table. (K1)

311-K. Mechanism of Ceramic-to-Metal Adherence. Adherence of Molybdenum to Alumina Ceramics. A.

G. Pincus. *Ceramic Age,* v. 63, Mar. 1954, p. 16-20, 30-32.

Experimental evidence points to need for controlled amount of oxide of metal available at metal-ceramic interface as an essential step in establishment of strong ceramic-to-metal bond. Micrographs, graph, diagram, table. 17 ref. (K11, Mo)

312-K. Annular Ceramic Tube. W. E. Coykendall. *Ceramic Age,* v. 63, Mar. 1954, p. 33-36; disc., p. 36.

Molybdenum-manganese joining process used to construct U.H.F. power triode with 30 to 2000 Mc range and 200 to 700 watts output. Photographs. (K11, Mo, Mn)

313-K. High-Tensile Steel Bolts for Structural Joints. I-II. *Engineer,* v. 197, Mar. 19, 1954, p. 415-417; Mar. 26, 1954, p. 453-455.

Properties of bolts, nuts and washers. Representative fastening method and a number of applications to railway bridges and other structures. Drawings, photographs. 2 ref. (T13, AY)

314-K. Studies in Resistance Welding Yield Improvements in the Manufacture of Thin-Wall Steel Tubing. Donald P. Worden. *General Motors Engineering Journal,* v. 1, Mar.-Apr. 1954, p. 14-18.

Equipment, operating techniques and applications. Diagrams, graphs. (K3, F26, ST)

315-K. The Pressure Welding of Molybdenum. A. R. Moss. *Institute of Metals, Journal,* v. 82, Apr. 1954, p. 374-378 + 4 plates.

Construction and use of controlled-atmosphere pressure-weld chamber. Micrographs, graphs. (K2, Mo)

316-K. Braze-Welds Join Cast Iron Conduit. *Linde Tips,* v. 33, Apr. 1954, p. 29-31.

Oxy-acetylene flame processes used in producing underground piping. Photographs. (K2, CI)

317-K. Design Manual on Adhesives. *Machine Design,* v. 26, Apr. 1954, p. 144-174.

Types and choice of adhesives, bonding methods and joint design. Photographs, tables, graphs, diagrams. (K12)

318-K. G.E.C. Precision Spot Welding Machine With Electronic Control. *Machinery (London),* v. 84, Mar. 19, 1954, p. 614-615.

Increase in scope of resistance welding made possible by recent 4 kv-amp. electronically controlled spot welder which welds many nonferrous metals not previously considered suitable for joining by this method. Photographs. (K3, EG-a)

319-K. Welded Joints in Stainless Equipment. *Metal Progress,* v. 65, Mar. 1954, p. 79.

Sound metal, properly chosen, correctly joined and adequately heat treated, is essential to avoid expensive and quick failures. (K1, SS)

320-K. A Fully-Automatic Welding Process. J. Burrows. *Overseas Engineer,* v. 27, Apr. 1954, p. 328-330.

High-amperage submerged arc provides faster welding, uniform quality and elimination of spatter. Costs reduced and operator fatigue lessened. Photographs. (K1)

321-K. Ceramic-Metal Seals of the Tungsten-Iron Type. D. G. Burnside. *RCA Review,* v. 15, Mar. 1954, p. 46-61.

Ceramic to be metallized is brush or spray coated with thin layer of mixed tungsten and iron powders and fired to a suitable temperature in a diluted reducing atmosphere. Photograph, diagrams, tables, graphs. (K11, W, Fe)

322-K. Structural Adhesives for Metal Aircraft. N. A. de Bruyne. *Rubber and Plastics Age,* v. 35, Mar. 1954, p. 119-121.

Advantages and limitations over other methods of making aircraft structures. 9 ref. (To be continued.) (K12)

323-K. Manufacture of Electrodes for the Arc Welding of Aluminum and Aluminum Alloys. L. V. Biryukova. *Henry Brutcher, Altadena, Calif., Translation no.* 3153, 3 p. (From *Avtogennoe Delo,* v. 24, no. 6, 1953, p. 25-26.)

Preparation of suitable coatings, composition, grinding, equipment needed, coating application, drying, storage of finished electrodes and precautions to be taken. (K1, T5, Al)

324-K. (French.) **Gluing of Metals in Aviation Structures.** F. Vinsonneau and C. Thomas. *Docaéro,* 1954, no. 26, Mar., p. 15-24.

Reasons for use of cement in large structural parts. Equipment and use of Redux and Araldite Type-I cements. Photographs. (K12)

325-K. (French.) **The Determination of Hydrogen in Arc Welds in Mild Steel. Method of Presentation of Results.** Albert Roux. *Revue de métallurgie,* v. 51, no. 3, Mar. 1954, p. 192-200; disc., p. 200-202.

Tests for suitable technique of obtaining samples for determination of hydrogen content. Tables, graphs, photograph. 3 ref. (K1, CN)

326-K. (German.) **Electrical Resistance Welding of Aluminum.** A. Müller-Busse. *Schweissen und Schneiden,* v. 6, no. 3, Mar. 1954, p. 93-102.

Principles, design and selection of machine circuits and controls. Recommends acid treatment of preparing surface. Electrodes, welding data and strength properties of the weld. Photographs, diagrams, graphs. 17 ref. (K3, L12, Al)

327-K. (German.) **Advances in the Field of Welding and Cutting.** J. Ruge. *Schweissen und Schneiden,* v. 6, no. 3, Mar. 1954, p. 115-117.

Review of recent publications on electric-arc welding. 30 ref. (K1)

328-K. (German.) **Use and Structure of Basic-Lime Coated Electrodes.** G. Zoethout. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 20, no. 2, Feb. 1954, p. 58-61.

More carbon and manganese were retained but less oxygen, nitrogen and hydrogen were introduced. Graphs, photograph. (K1)

329-K. (Russian.) **Low-Temperature Welding With Use of Induction Heating of Welded Parts.** A. I. Alekseev. *Vestnik Mashinostroeniia,* v. 33, no. 10, Oct. 1953, p. 79-80.

Process and results of experimental tests. Diagrams. (K6)

330-K. (Russian.) **High-Speed Automatic Gas Welding of Thin Walled Pipes.** I. A. Antonov. *Vestnik Mashinostroeniia,* v. 33, no. 10, Oct. 1953, p. 81-84.

Includes diagrams, graph, table, photograph, micrograph. (K2)

331-K. (Spanish.) **How to Weld Babbitt Metal.** *Fusion de Metales,* v. 16, no. 2, Mar.-Apr. 1954, p. 5-9.

Heating effects, preparation of pieces, puddle rod and welding process. Drawings. (K general, SG-c)

332-K. High Temperature Metal Ceramic Seals. Harry Bender. *Ceramic Age,* v. 63, Apr. 1954, p. 15 + 9 pages.

Telefunken process, hydride method and active metal technique. Tables, photographs, micrographs. 35 ref. (K11)

333-K. Shrink-Fit Investigations on Simple Rings and on Full-Scale Crankshaft Webs. A. S. T. Thomson, A. W. Scott and C. M. Moir. *Engineer,* v. 197, Apr. 9, 1954, p. 531-533.

Results of behavior of simple ring-and-plug arrangements and model two-pin web assemblies. Diagrams, graphs. (K13)

334-K. Seam Welding With Wire Electrode. *Engineering,* v. 177, Apr. 2, 1954, p. 445.

Thin metal sheets welded at speed of 2 ft. per min. with electronically-controlled seam welder. Photograph. (K3, ST, Ni, Cu)

335-K. Research and Development Work on Electric Welding. *Engineering,* v. 177, Apr. 9, 1954, p. 476-477.

New laboratory of Quasi-Arc Co., Ltd., designed to control raw materials and perform basic electrode research and development. Photographs. (K1)

336-K. Why Automatic Welding? Jack Jarms. *Industry & Welding,* v. 27, May 1954, p. 49-52, 82-83.

Labor and overhead costs reduced by versatile method. Photographs. (K1)

337-K. Fabricate High Tensile Steel With Inert Arc Welding Process. I. Morrison. *Industry & Welding,* v. 27, May 1954, p. 58-60, 63, 83.

Tests on fuel tank fabrication show good welds with desirable physical characteristics of arc welding, but without excessive penetration and with much less porosity. Photographs. (K1, AY)

338-K. Contact Electrodes. A Special *Industry & Welding* Report. *Industry & Welding,* v. 27, May 1954, p. 64 + 6 pages.

Study of contact-type welding electrodes. Electrodes with iron powder in their coatings are claimed to be a radical departure from standard electrode design. Graphs, photographs, chart, diagrams. (K1)

339-K. Speed Welding of Silicon Bronze With Semi-Automatic Inert-Arc Process. Donald Baumler. *Industry & Welding,* v. 27, May 1954, p. 118-120.

Method used in fabrication of 25-ton vapor condenser. Photographs, diagram. (K1, Cu)

340-K. Titanium Welding Procedures. *Light Metal Age,* v. 12, Apr. 1954, p. 15, 35.

Techniques of shielding weld and adjoining parent-metal sections from atmosphere while at temperatures above about 1400° F. (K general, Ti)

341-K. Tools for Koldwelding Wire and Sheet. W. A. Barnes. *Modern Metals,* v. 10, Apr. 1954, p. 57-59.

Tools for joining nonferrous metal parts without use of heat, electricity, acid flux or other chemicals. Drawings, photographs. (K5, EG-a)

342-K. Automatic Arc and Resistance Welding as Applied to Sheet and Strip Metal. J. A. Dorrat. *Sheet Metal Industries,* v. 31, no. 324, Apr. 1954, p. 301-308, 310.

Automatic welding as applied to metallic, atomic-hydrogen and argon-arc welding. Resistance welding considered. Diagrams, tables, photographs. (To be concluded.) (K1, K3)

343-K. The Welding of Nickel and High Nickel Alloys. Lester F. Spencer. *Sheet Metal Worker,* v. 45, Apr. 1954, p. 70-72, 88.

Excellent weld joints in high-nickel alloys obtained by oxy-acetylene welding procedure in practically all types of welding positions. Tables, photograph, diagrams. (To be continued.) (K2, Ni)

344-K. A Way to Use Titanium Scrap. *Steel,* v. 134, Apr. 26, 1954, p. 104.

Solid ingot of metal is formed by resistance spot welding a thick stack of scrap sheets submerged in liquid. Coolant solves oxidation and heat problems. Photographs. (K3, A8, Ti)

345-K. Powdered Iron in Electrode Designs. L. K. Stringham. *Steel Processing*, v. 40, Apr. 1954, p. 224-225.

Heavily coated electrodes containing large quantities of powdered metal in their coatings permit increased welding speeds with appearance in smoothness and freedom from spatter almost equal to that obtained with automatic welding. Photographs, table. (K1)

346-K. Joining Thin Walled Parts by Deforming With Rubber. Frank R. Simpson. *Tool Engineer*, v. 32, May 1954, p. 71-74.

Abstracted from ASTE paper 22T2. Equipment, procedures, limitations and applications. Diagrams. (K11)

347-K. Cold Pressure Welding. W. A. Barnes. *Tool Engineer*, v. 32, May 1954, p. 75-78.

Abstracted from ASTE paper 22T37. Clean interfaces of relatively soft metals are kneaded and flowed together by tooling of special configurations. Photographs. (K5)

348-K. New Welding Laboratories at Bilston. *Welding and Metal Fabrication*, v. 22, Apr. 1954, p. 149-153.

Equipment and methods to provide facilities for quality control, research and development. Photographs. (K general)

349-K. In the Fabrication Shop. *Welding and Metal Fabrication*, v. 22, Apr. 1954, p. 156-157.

Practical aspects of welding and metalworking. Diagrams, photograph. (K general, G general, Al, Cu, Zn)

350-K. Multiple Electrode Welding by "Unionmelt" Process. D. E. Knight. *Welding Journal*, v. 33, Apr. 1954, p. 303-312.

Nomenclature and power supply in multiple-submerged arc welding. Advantages and applications of several types of connections. Diagrams, photographs. 1 ref. (K1)

351-K. Resistance Spot Welding of Titanium and Its Alloys. A. J. Rosenberg. *Welding Journal*, v. 33, Apr. 1954, p. 324-328.

Properties of spot welded joints in titanium and its alloys. Comparisons with spot welded joints in other materials. Tables, photographs, graphs. 1 ref. (K3, Ti)

352-K. Welding of 90/10 Copper-Nickel Alloy. G. R. Pease and T. E. Kihlgren. *Welding Journal*, v. 33, Apr. 1954, p. 329-338.

Data indicate iron-bearing 90-10 cupronickel can be satisfactorily welded by all currently important fusion-welding processes. Important variables defined. Suggested areas of usefulness for several methods. Tables, diagram, graphs, photographs, radiographs. 6 ref. (K general, Ni, Cu)

353-K. Twinarc Submerged Arc Welding. Theodore Ashton. *Welding Journal*, v. 33, Apr. 1954, p. 350-355.

Use of two small diameter electrodes in place of one larger electrode in a single submerged-arc welding head. Diagram, photographs. (K1)

354-K. D-C Welders—Rectifiers or Motor Generator Sets? S. Oestreicher. *Welding Journal*, v. 33, Apr. 1954, p. 356-360.

Compares static and dynamic performance characteristics. Photographs, diagram, graphs, table, oscillograms. (K1)

355-K. Carbon-Steel Electrodes for Use With Inert Gas Shields. Harry C. Cook and Gilbert R. Rothschild. *Welding Journal*, v. 33, Apr. 1954, p. 361-371.

Study of properties of weld deposits from an electrode for production use in welding of carbon steel by inert-gas-shielded metal-arc process. Use of fully killed steel electrode indicated. Tables, graphs, photographs. (K1, CN)

356-K. Low-Temperature Welding Alloys Speed and Simplify Structural Model Fabrication. Sidney Shore and Edward W. Rothfuss, Jr. *Welding Journal*, v. 33, Apr. 1954, p. 376-379.

Study of a model provides empirical data for designers of suspension bridge to determine adequacy of lateral bracing. Effect of torsional loading upon the stiffness and stress distribution in the truss. Photographs, diagram. (K general, Q25)

357-K. Army First Pass Groove Weld Crack Susceptibility Test. Z. J. Fabrykowski, S. Goodman and B. A. Schevo. *Welding Journal*, v. 33, Apr. 1954, p. 168S-172S.

Test is predicated on necessity of producing satisfactory crack-free first pass welds and bringing welding to scientific level. Diagrams, photographs, tables. (K9)

358-K. High Temperature Brazing Shows Big Future for Bonding Jet Age Metals. George D. Cremer, Frank J. Filippi and Richard S. Mueller. *Western Metals*, v. 12, Apr. 1954, p. 43-47.

Commercially available brazing alloys include copper, Coast metals, silver-manganese, manganese-nickel, palladium-silver, palladium-nickel, Solabraze and Nicrobraz. Photographs, micrographs. (K8, Cu, Ag, Mn, Ni, Pd)

359-K. Arc-Welding Electrodes and Their Manufacture. I. G. Fritz. *Wire and Wire Products*, v. 29, Apr. 1954, p. 410, 412, 451. (Translated from article in *Draht*, Sept. 1953.)

Brief history of coated electrode processes. Current practice in electrode manufacture in Germany. (K1, T5)

360-K. Brazing Titanium to Titanium and to Mild and Stainless Steels. W. J. Lewis, G. E. Faulkner, P. J. Rieppel and C. B. Voldrich. Wright Air Development Center Materials Laboratory. WADC Technical Report 52-313, pt. 2, Dec. 1953, 50 p.

Joints were induction, torch and furnace brazed with commercial and experimental alloys. Induction brazed joints were strongest. Titanium-to-steel joints were difficult. Ductility was poor in titanium-titanium joints. (K8, Ti, CN, SS)

361-K. (French.) **Inspection of Welded Construtcions.** W. J. Kaufman. *Métallurgie et la construction mécanique*, v. 86, no. 3, Mar. 1954, p. 203 + 8 pages; disc., p. 215-217, 219, 221.

Analysis before production, supervising production and destructive and nondestructive testing. Tables, photographs, diagrams. (K general, S general)

362-K. (French.) **Modern Welding Material.** Raoul Soulier. *Métallurgie et la construction mécanique*, v. 86, no. 3, Mar. 1954, p. 223-225, 227-229.

Recent developments in various methods of welding. Preparation, assembling and handling of boiler parts. Photographs, graph. (K general)

363-K. (French.) **Application of Electrical Resistance Welding.** G. Moressée. *Métallurgie et la construction mécanique*, v. 86, no. 3, Mar. 1954, p. 231-232.

Assembling of frame parts by spot welding. Technical and economical advantages. Photographs. (K3)

364-K. (French.) **Noncorrosive Brazing With a Soldering Iron.** *Revue de l'Aluminium*, v. 31, no. 208, Mar. 1954, p. 96-97.

Cadmium-zinc compound with melting point of 280° C. Easy to apply and useful for joining aluminum roofing. Photographs. (K8, Cd, Zn, Al)

365-K. (French.) **Mechanical Riveting of Light Metals.** B. Adaridi. *Revue de l'Aluminium*, v. 31, no. 208, Mar. 1954, 123-129.

Development and operation of hydraulic and oleo-pneumatic riveting machines. Diagrams, graphs, photographs, tables. (To be continued.) (K13, Al)

366-K. (German and French.) **Weldable Malleable Iron "GF".** Th. Walter. *Zeitschrift für Schweisstechnik*, v. 44, no. 4, Apr. 1954, p. 86-90.

Melted by a special process, this iron is characterized by low silicon and sulfur content. Carbon content of weld joints is reduced by a special heat treatment. (K general, CI)

367-K. (German.) **Press Welding Experiments With Armco Iron at Temperatures Between 400 and 800° C.** Helmut Held and Hans Hendus. *Zeitschrift für Metallkunde*, v. 45, no. 3, Mar. 1954, p. 112-116.

Dependence of joint strength on temperature in vacuum-welding process. Diagram, table, graphs. 12 ref. (K5, Fe)

368-K. (Russian.) **Production and Repair of Forge Dies by Electroweld Build-Up.** P. I. Tabachnikov and P. P. Gol'man. *Vestnik Mashinostroeniia*, v. 34, no. 3, Mar. 1954, p. 54-57.

Preparation, chemical composition and performance of electrodes. Diagrams, tables, micrographs. (K1)

369-K. (Russian.) **Automatic Arc Welding of Aluminum Alloys.** A. A. Alov and G. D. Nikiforov. *Vestnik Mashinostroeniia*, v. 34, no. 3, Mar. 1954, p. 60-63.

Apparatus and methods showing advantages of simplicity, high productivity, low cost and high-quality welds. Photographs. (K1, Al)

370-K. (Russian.) **Electro-Rivet Welding.** S. I. Sobolev and N. E. Petukhov. *Vestnik Mashinostroeniia*, v. 34, no. 3, Mar. 1954, p. 66-69.

Method is simpler, less expensive and more applicable than contact welding. Diagrams, photograph, table. (K6)

371-K. Subcommittee Report on New Specification for Bare Stainless Steel Welding Rods and Electrodes. *ASTM Bulletin*, 1954, no. 198, p. 77-80.

Applicable to filler metals for use in a wide variety of processes. Diagrams, tables. 1 ref. (K1, T5, SS)

372-K. Researches on Welded Pressure Vessels and Pipelines. Nicol Gross. *British Welding Journal*, v. 1, Apr. 1954, p. 149-160.

Strain measurements in pressure vessels, in connection with stress peaks in drumheads and around large openings such as nozzles. Diagrams, tables, photographs, graphs. 29 ref. (K9, Q25, ST)

373-K. Some Oxidation Effects During the Pressure Welding of Steels. J. E. Hughes. *British Welding Journal*, v. 1, Apr. 1954, p. 161-166.

Inhomogeneities in structure of steel pressure welds result from internal oxidation of elements such as silicon and manganese. Products of reaction nucleate ferrite at the weld plane and lead to sharp discontinuities in carbon concentration. Table, micrographs. 8 ref. (K2, ST)

374-K. Hydrogen—Barrier to Welding Progress. C. L. M. Cottrell. *British Welding Journal*, v. 1, Apr. 1954, p. 167-176.

Sources of hydrogen and effect on mechanical properties of steels. Tables, graphs, photographs. 25 ref. (K general, Q general, ST)

375-K. Weldability of Mn-Mo Steel Related to Properties of the Heat-Affected Zone. C. L. M. Cottrell. *British Welding Journal,* v. 1, Apr. 1954, p. 177-186.

Mechanical properties of commercial manganese-molybdenum steel studied after simulating conditions which occur in heat-affected zone adjacent to metal-arc welds. Tables, diagrams, photographs, micrographs. 14 ref. (K9, Q general, AY)

376-K. (Pamphlet.) **Recommended Practices for Repair Welding of Cast Iron Pipe Valves and Fittings.** 12 p. 1954. American Welding Society, 33 W. 39th St., New York 18, N. Y. $0.50.

Practical details of repair methods. Materials covered include gray iron, white cast iron, chilled cast iron, malleable iron, alloy cast iron, and nodular cast iron. Welding processes include arc welding with nickel, mild steel, cast iron, and copper-base electrodes; oxy-acetylene welding and braze welding; and carbon-arc welding. (K1, K2, CI)

377-K. (Book.) **Brazing and Soldering of Titanium and Its Alloys.** 117 p. U. S. Dept. of Commerce, Office of Technical Services, Washington 25, D. C. PB 111225. $3.00.

Results of recent experimental procedures, with special attention to means for developing maximum heat nearest to overlapping surfaces and protecting them from harmful oxidation. (K7, K8, Ti)

378-K. (Book.) **Metallurgy of Welding.** W. H. Bruckner. 290 p. 1954. Pitman Publishing Corp., 2 W. 45th St., New York 19, N. Y. $6.00.

Supplies background for specification of metals for welding, design of welding joints, and compounding of coatings for metallic electrodes. (K general)

379-K. (Book.) **Welding, Brazing and Metal Cutting.** E. Malloy, editor. George Newnes, Ltd., Tower House, Southhampton Street, London W.C. 2, England. 15s.

Introduction to these processes compiled by a number of individuals and companies. (K general, G22)

L

Cleaning, Coating and Finishing

418-L. Uses of Ultrasonics in Degreasing Processes. Thomas J. Kearney. *Acoustical Society of America, Journal,* v. 26, Mar. 1954, p. 244-246.

Detrex Soniclean process combines sound energy and trichlorethylene solvent degreasing for metal cleaning. Photographs. (L10, L12)

419-L. Laboratory and Plant Evaluations of Liquid Neoprene Coatings. R. B. Seymour. *Corrosion,* v. 10, Apr. 1954, p. 116-121.

Characteristics of several compositions, application and curing techniques, resistance to certain chemicals and conformity with military and industrial standards. Table. 6 ref. (L26)

420-L. Minimizing Contact Potential in Apparatus Design. E. C. J. Marsh. *Electronic Engineering,* v. 26, Apr. 1954, p. 148.

Choice of electroplated, sprayed or hot-dipped coatings can materially assist in design problems. Photographs, tables. (L general, P15)

421-L. Bi-Metallic Bonding. *Engineering,* v. 177, Mar. 26, 1954, p. 409.

Properties of aluminum and ferrous metals are combined in bonding. Micrograph, photograph, drawings. (L22, Al, Fe)

422-L. Metal Spraying for Corrosion Prevention. C. A. Robiette. *Industrial Finishing (London),* v. 6, Mar. 1954, p. 564-570, 572-573.

Equipment, methods and applications. Drawing, photograph. 4 ref. (L23)

423-L. New System Cuts Waste Pickle Liquor Disposal Costs. D. A. Dahlstrom. *Iron Age,* v. 173, Apr. 8, 1954, p. 150-153.

Design, operating procedures and advantages. Photographs, diagram, graph, table. (L12)

424-L. Production Tin-Zinc Alloy Plating. Alan Whittaker. *Machinery (London),* v. 84, Mar. 26, 1954, p. 639-642.

Characteristics of coating, equipment, techniques and variables influencing process. 2 ref. (L17, Sn, Zn)

425-L. Two New High Temperature Coatings. Alexander Pechman. *Materials & Methods,* v. 39, Apr. 1954, p. 94-96.

Flame-sprayed cermet and weld-through ceramic described. Materials, equipment and techniques of processes. Photographs. (L27)

426-L. Quality Hard Facing. John Wischhusen. *Materials & Methods,* v. 39, Apr. 1954, p. 140-142.

Advantages, applications and techniques of process and factors affecting quality of hard facing. Photographs. (L24)

427-L. Surface Preparation of Steel for Painting. Joseph Bigos. *Metal Progress,* v. 65, Apr. 1954, p. 123-126, 154, 156.

Methods of solvent, hand, power tool and flame cleaning. Photographs. (L10, L12, ST)

428-L. How to Make Iron Powder Components Resistant to Rust and Wear. Richard P. Seelig. *Precision Metal Molding,* v. 12, Apr. 1954, p. 103-106.

Method involves reaction between a chromium-rich gas and ferrous surface followed by diffusion. Applied to sinterings, forgings, castings and machined parts. Table, micrographs, photographs. (L15, H11)

429-L. Technical Problems in the Finishing Shop: Maintaining Efficiency in Trichlorethylene Degreasing Plants. E. E. Halls. *Product Finishing,* v. 7, Mar. 1954, p. 55-69, 118.

Development of process, equipment, techniques and applications. Tables, graphs, photograph, diagram. (L12)

430-L. Production Barrel Plating to Specifications. Ezra A. Blount. *Products Finishing,* v. 18, Apr. 1954, p. 24-32, 34, 36.

Equipment, plant layout and operating procedures. Photographs, diagram. (L17)

431-L. Flat Polishing. Adam Zimmerman. *Products Finishing,* v. 18, Apr. 1954, p. 56 + 9 pages.

History, applications, construction of equipment and techniques of process. Diagram, graphs, table. (L10)

432-L. Continuous Galvanizing Line. II. Design Is Key to Simple Controls. D. A. McArthur, A. R. Geiszler and John Upton, Jr. *Steel,* v. 134, Apr. 12, 1954, p. 102-104.

Division of line into three sections affords excellent arrangement for good control system. Close speed regulation between sections for synchronization is eliminated. Photographs. (L16, Zn)

433-L. Steel Wears a Topcoat. Robert Froman. *Steelways,* v. 10, Apr. 1954, p. 24-27.

Method for covering cheap but strong carbon steel with costlier metals possessing special properties. Photographs. (L22, CN)

434-L. Preparation, Properties and Optical Applications of Thin Films of Titanium Dioxide. Georg Hass. *Vacuum,* v. 2, Oct. 1952, p. 331-345.

Optical properties, structure and oxidation of evaporated titanium films. Structure, properties and applications of titanium dioxide coatings. Graphs, radiographs, tables, diagrams. 22 ref. (L25, P17, Ti)

435-L. The Distribution of Thin Films Condensed on Surfaces by the Vacuum Evaporation Method. L. Holland and W. Steckelmacher. *Vacuum,* v. 2, Oct. 1952, p. 346-364.

Problem of determining laws of distribution of thin film deposits evaporated in vacuum. From various types of practical sources, idealized sources are evolved for which emission of vapor can be calculated. Diagrams, tables, graphs. 26 ref. (L25)

436-L. Aluminium Reflecting Films Applied to Glass and Plastics by Thermal Evaporation. I. Aluminium Films on Glass With Particular Reference to Front Surface Mirrors. S. Bateson. *Vacuum,* v. 2, Oct. 1952, p. 365-376.

Fundamental principles governing deposition of aluminum films upon various materials. Tables, drawing, photograph, graphs. 10 ref. (To be continued.) (L25, Al)

437-L. Impregnation of Steel With Titanium in a Mixture of Molten Sodium Carbonate and Titanium Dioxide. S. Kowal. *Henry Brutcher, Altadena, Calif., Translation no.* 3152, 12 p. (From *Prace Instytutow Mechaniki* (Warsaw), 1953, no. 6, p. 5-12.)

Experimental materials and procedure. Effect of treating time and temperature upon case thickness. Micrographs, graphs, tables. 11 ref. (L14, CN, Ti)

438-L. (English.) **The Effects of Space Charge on the Rate of Formation of Anode Films.** Jacob F. Dewald. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 340-341.

Discrepancies in data on anodic oxidation of tantalum analyzed and explained. Graph. 2 ref. (L19, Ta)

439-L. (French.) **Advantages Derived From Use of Aluminum in Galvanizing.** R. Souské. *Métaux, Corrosion-Industries,* v. 29, no. 342, Feb. 1954, p. 88-89.

Deoxidizing action, adherence properties and effect on zinc-iron alloy. Graphs. (L16, Al, Zn)

440-L. (French.) **Protection of Aluminum and Its Alloys With Paints. II.** André Guilhaudis and Régine Bourbon. *Revue de l'Aluminium,* v. 31, no. 207, Feb. 1954, p. 47-51.

Efficiency of protection given by primary coatings and finishes. Graphs, micrographs, table. 4 ref. (L26, Al)

441-L. (French.) **The Continuous Galvanizing of Steel Strip by Sendzimir Process.** A. Ollivet. *Revue de métallurgie,* v. 51, no. 1, Jan. 1954, p. 17-24 + 1 plate; disc., p. 25-27.

Special heat treatment in controlled atmosphere before galvanizing causes oxidizing and reducing reactions, changes in crystal structure and increased temperature of strip, insuring perfect adherence of

coating. Photographs, diagrams. (L16, Zn, CN)

442-L. (French.) **The Tube Galvanizing Shop of the Société Lorraine Escaut.** J. Fleischmann. *Revue de métallurgie,* v. 51, no. 1, Jan. 1954, p. 28-34; disc., p. 34-35.

Successive operations, output, consumption of zinc and fuel and by-products obtained. Diagram, photographs, graphs. (L16, Zn)

443-L. (French.) **Effect of the Quality of Coating on Corrosion Resistance of Galvanized Steel Wires.** Jean Hérenguel. *Revue de métallurgie,* v. 51, no. 1, Jan. 1954, p. 36-44; disc., p. 44.

Thickness, structure, brittleness and accelerated corrosion tests. Tables, graphs, micrographs, diagram. (L16, R general, CN, Zn)

444-L. (German.) **Research on Formation of Pores and Pin Points in Highly Acid-Resistant Enamelled Cast-Iron Apparatus.** Jens Holm and Hildegard Schneider. *Silikat Technik,* v. 5, no. 1, Jan. 1954, p. 13-22.

Nondefective coatings produced on cast iron with high phosphorus and sulfur content. Tables, graphs, micrographs, diagram. (L27, CI)

445-L. (German.) **Preparation and Passivation of Light Metals for Painting.** Bernhard F. H. Scheifele. *Werkstoffe und Korrosion,* v. 5, no. 3, Mar. 1954, p. 94-98.

Method produces metal organic protective films by use of reactive primers. Films function as anticorrosive coatings and adhesive substrates for paint and lacquer coatings. 12 ref. (L12, L26, Al, Mg)

446-L. (Russian.) **Microscopic Study of Cementation of Copper by Nickel Powder.** A. A. Bulakh and R. K. Drachevskaia. *Zhurnal Prikladnoi Khimii,* v. 26, no. 11, Nov. 1953, p. 1225-1226.

Because of surface heterogeneity or impurities, a short-circuited galvanic element is formed on each grain of nickel powder. Diagram, micrographs. 4 ref. (L15, H16, Cu, Ni)

447-L. Ryan Develops Ceramic-Liner Techniques. *Aviation Week,* v. 60, Apr. 26, 1954, p. 38, 40, 42.

New ways to apply and work with coatings point to solution of some high-heat power plant problems. Photographs. (L27)

448-L. Coating With Mastics. Raymond B. Seymour and Robert H. Steiner. *Chemical Engineering,* v. 61, May 1954, p. 232 + 5 pages.

Asphaltic mastics protect steel against splash and fumes of salts, alkalis and nonoxidizing acids up to 150° F. Photographs, charts. (L26, ST)

449-L. Resin Bonded Chemical Treatments. "Wash Primers" for Metal Surfaces. M. D. Phelps. *Finish,* v. 11, May 1954, p. 67-68, 84-85.

Development of primer composed of phosphoric acid, vinyl butyral resin and special zinc chromate pigment. Tables. (L14)

450-L. Automatic Cleaning, Painting of Mult-a-Frame Channels. M. M. Roberts. *Industrial Finishing,* v. 30, Apr. 1954, p. 28-32, 37-38.

Conveying system automatically handles products for finishing process. Large units occupy two stories. Photographs, diagrams. (L26, L12)

451-L. New Low-Cost Coating Gives Mild Steel Good Corrosion Resistance. G. J. Harvey. *Iron Age,* v. 173, Apr. 15, 1954, p. 125-127.

Fast, low-cost application of a nickel-phosphorus coating gives mild steel corrosion resistant properties comparable to some stainless steels. Application by brushing, dipping or spraying. An oxide of nickel is reduced on coated surface at a temperature much lower than that of either the base metal or nickel. Photographs, micrograph, graph. (L14, CN)

452-L. Aluminum Hard Coating Methods Review. *Light Metal Age,* v. 12, Apr. 1954, p. 10-11, 24.

Materials, equipment, techniques and applications. Photographs, tables. (L24, Al)

453-L. HAE Process. Harry Evangelides. *Light Metal Age,* v. 12, Apr. 1954, p. 12-13, 33-34.

Techniques and characteristics of magnesium hard surfacing. Photographs, diagram. (L14, Mg)

454-L. Plating on Lead Alloys, Pewter and Britannia. Joseph Haas. *Metal Finishing,* v. 52, Apr. 1954, p. 56-61.

Practical, simple and accurate method of plating any metal on lead and tin alloys. (L17, Pb, Sn)

455-L. Metallizing With an Aqueous Platinic Chloride Solution. Louis Silverman and Katherine Trego. *Metal Finishing,* v. 52, Apr. 1954, p. 69.

Solution containing selected reducing agent may be applied to many shapes of aluminum oxide, porcelain, ceramics, silicaware, quartz and etched Pyrex. Adherent, electrical conducting coating of pure platinum is obtained. 8 ref. (L14, Pt)

456-L. Bronze and Speculum Plates Provide Good Protection for Steel. W. H. Safranek, W. G. Hespenheide and C. L. Faust. *Metal Finishing,* v. 52, Apr. 1954, p. 70-73, 78.

Salt-spray and outdoor-exposure tests demonstrate bronze alloy plate protects steel better than copper and/or nickel plates. Tables, photographs, micrograph. 16 ref. (L17, ST, Cu, Ni)

457-L. A Porosity Test for Electrodeposits on Zinc-Base Die-Castings. H. K. Lutwak. *Metal Finishing,* v. 52, Apr. 1954, p. 76-78.

Materials, apparatus and techniques. 8 ref. (L17, Zn)

458-L. Finishing Supplement. Sprayed Metallic Coatings. H. Reininger. *Metal Industry,* v. 84, Mar. 26, 1954, p. 251-253; Apr. 2, 1954, p. 265-266; Apr. 9, 1954, p. 291-293.

Dependence of adhesive strength of coatings on surface condition of the metal. Surface preparation and treatment after coating. 83 ref. (L23, Cd, Sn, Bi, Pb, Sb, Zn, Al)

459-L. Chemical Plating Process. I. A. Campbell. *Modern Metals,* v. 10, Apr. 1954, p. 68, 70-71.

New process will help relieve nickel shortage and provides same protection as electroplating using only ½ to 1/3 as much nickel. It is fast, accurate and nonelectric. Photographs. (L14, Ni)

460-L. The Navy's Search for Anti-Corrosive Coatings for Magnesium. George W. Grupp. *Organic Finishing,* v. 15, Apr. 1954, p. 15.

Magnesium chromate and magnesium fluoride plus zinc chromate is an improvement. "Micalith-G" and calcium chromate are good. (L14, Mg)

461-L. Production Barrel Plating to Specifications. Ezra A. Blount. *Products Finishing,* v. 18, Apr. 1954, p. 24-32, 34, 36.

Copper, nickel, zinc and cadmium can be plated in barrel plating installation recently completed. Photographs, diagrams. (L17, Cu, Ni, Zn, Cd)

462-L. The Finishing of Aluminum. Structural Features of Oxide Coatings on Aluminum. Seymour Senderoff. *Products Finishing,* v. 18, Apr. 1954, p. 78 + 4 pages.

Decorative and protective oxide coatings formed in electrolytes containing sulfuric or chromic acids. Diagram, table, micrographs. (L14, Al)

463-L. Metal Finishing Practice at the Denham Works of Martin-Baker Aircraft Co. Ltd. *Sheet Metal Industries,* v. 31, no. 324, Apr. 1954, p. 284-287.

Methods of anodizing and dyeing of light alloys, nickel, copper, chromium and cadmium plating, hard chromium plating on light alloys, chromate treatment of magnesium, phosphate treatment of ferrous parts and black finishes on brass and stainless steel. Photographs. (L general)

464-L. Surface Treatment and Finishing of Light Metals. IX. S. Wernick and R. Pinner. *Sheet Metal Industries,* v. 31, no. 324, Apr. 1954, p. 320-324, 340.

Various types of organic coatings and applications. Tables, photographs. (To be continued.) 19 ref. (L26, Al)

465-L. The Applications of Blast Cleaning in Steel Processing. II. Blast Cleaning Machines. Victor F. Stine. *Steel Processing,* v. 40, Apr. 1954, p. 231-236, 253.

Numerous types of blast cleaning machines developed classified in general groups according to type of work for which they have been designed. Photographs, tables. (L10, ST)

466-L. (French.) **Struggle Against Corrosion of Iron. Protection by Painting.** Albin Marty. *Métallurgie et la construction mécanique,* v. 86, no. 3, Mar. 1954, p. 235 + 6 pages.

Preparation of surfaces, types of paints and application. (L26, Fe)

467-L. (French.) **New Degreasing Agent. Paroxal 2.** Georges Riviere. *Revue de l'Aluminium,* v. 31, no. 208, Mar. 1954, p. 101-102.

Contains phosphoric acid. Possesses cleaning and etching power. Tables. (L12, Al)

468-L. (German.) **Experiments on Sand-Blasting Media.** W. Gesell. *Giesserei,* v. 41, no. 7, Apr. 1, 1954, p. 160-163.

Service life curves of granulated cast iron scrap and silica. Graphs. (L10)

469-L. (German.) **Prevention of Corrosion in Mineral-Oil Storage Tanks.** H. B. Footner. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 20, no. 3, Mar. 1954, p. 72-75.

Preparation and coating of inside and otuside of storage equipment. (L26, R7)

470-L. (German.) **Selected Methods of Heating Zinc-Plating Tanks.** Josef Kohlgrüber, Josef Leutbecher, and Theodor Türk. *Stahl und Eisen,* v. 74, no. 8, Apr. 8, 1954, p. 464-474.

Three new possibilities of heating galvanizing tanks. Examples of application and relative thermal and economic efficiencies. Diagrams, graphs, photographs. 4 ref. (L16, Zn)

471-L. (Russian.) **Controlling the Properties of Ground Enamel Coats for Steel.** K. P. Azarov. *Zhurnal Prikladnoi Khimii,* v. 27, no. 1, Jan. 1954, p. 33-42.

Comparison of coatings with and without boron. Additions of strong fluxes. Graphs, diagrams, tables. 10 ref. (L27, ST)

472-L. (Russian.) **Electrochemical Deposition of Very Hard Gold Coats.** N. P. Fedot'ev, N. M. Ostroumova and P. M. Viacheslavov. *Zhurnal Prikladnoi Khimii,* v. 27, no. 1, Jan. 1954, p. 43-50.

Optimum conditions of deposition in gold-nickel baths. Precipitates tested for microhardness and wear resistance. Tables, graphs. 7 ref. (L17, Q9, Q29, Au, Ni)

473-L. (Russian.) **Removing the Coat of Lead-Tin Alloy From Lead-Treated**

Iron. V. P. Kochergin. *Zhurnal Prikladnoi Khimii,* v. 27, no. 1, Jan. 1954, p. 51-54.

Increased temperatures and concentration of potassium hydroxide or addition of meta-nitrobenzoic acid accelerate removal of zinc and tin. Table, graphs. 6 ref.
(L12, Fe, Sn, Pb)

474-L. (Russian.) **Structure of Copper-Nickel Anodes and Process of Sediment Formation.** A. A. Bulakh and O. A. Khan. *Zhurnal Prikladnoi Khimii,* v. 27, no. 1, Jan. 1954, p. 111-112.

Amount of sedimentation on cast alloy anodes shown to be higher than on annealed alloy anodes. Table. 7 ref. (L17, Cu, Ni)

475-L. (Russian.) **Reactivation of Electrolyte for Polishing Steel.** N. P. Fedot'ev, E. G. Kruglova and S. Ia. Grilikhes. *Zhurnal Prikladnoi Khimii,* v. 27, no. 2, Feb. 1954, p. 157-165.

Reasons for cessation of electrolytic activity and method of regeneration. Tables, graphs. 4 ref.
(L13, ST)

476-L. (Russian.) **Potentials of Copper and Nickel Sulfides.** A. A. Bulakh and O. A. Khan. *Zhurnal Prikladnoi Khimii,* v. 27, no. 2, Feb. 1954, p. 166-170.

Composition of electrolyte and electrode used. Tables, graphs, diagram. 5 ref. (L17, Cu, Ni)

477-L. (Russian.) **Influence of Thiocarbamide on Electrocrystallization of Nickel.** L. I. Antropov and S. Ia. Popov. *Zhurnal Prikladnoi Khimii,* v. 27, no. 2, Feb. 1954, p. 206-209.

Possibility of producing lustrous nickel precipitates. Graphs, micrographs. 6 ref. (L17, Ni)

478-L. Advances in Electroplating. W. H. Safranek. *Battelle Technical Review,* v. 3, May 1954, p. 49-52.

Uses and improvements in electroplating, bronze as a substitute for nickel, special electroplates and electropolishing. Micrograph, oscillograms. (L17, L13, Cu)

479-L. Recent Advances in Electrodeposition. J. W. Cuthbertson. *Birmingham Metallurgical Society, Journal,* v. 33, Dec. 1953, p. 156-172.

Review of new and improved processes. Tables, micrographs, photographs, graphs, diagram. 14 ref.
(L17)

480-L. Contribution to the Theory of Electropolishing. Carl Wagner. *Electrochemical Society, Journal,* v. 101, May 1954, p. 225-228.

Ideal process is characterized by plateau of current density-potential curve corresponding to maximum diffusion rate of acceptor for metal ions toward anode. Graphs. 15 ref.
(L13)

481-L. Adherence of Electrodeposited Zinc to Aluminum Cathodes. F. H. C. Kelly. *Electrochemical Society, Journal,* v. 101, May 1954, p. 239-243.

Apparatus and techniques for measuring adherence. Diagram, tables. 6 ref. (L17, Al, Zn)

482-L. Theory and Practice of Chemical Polishing. III. The Theory of Chemical Polishing. R. Pinner. *Electroplating and Metal Finishing,* v. 7, 1954, p. 127-131, 140.

Theory of metal dissolution in acid solution. Various types of film growth and their importance in suppressing etch-attack. Graphs. 13 ref. (L12)

483-L. Factors Affecting the Choice of Finish for Electrical Equipment. E. C. J. Marsh. *Electroplating and Metal Finishing,* v. 7, 1954, p. 132-135.

Typical examples of equipment and techniques. Photographs.
(L general, T1)

484-L. Depreciation and Maintenance of Metal Finishing Plant. II. "Straightline" Method of Computing Depreciation of Pumps, Tanks and Storage Plant. S. Howard Withey. *Electroplating and Metal Finishing,* v. 7, 1954, p. 136-138.

Method calculates and records depreciation in capital value of specific units and groups of equipment. Tables. (To be continued.)
(L general, A5)

485-L. The G.K.N. Micro-Hardness Tester in Metal Finishing. *Electroplating and Metal Finishing,* v. 7, 1954, p. 147-148.

Instrument and performance characteristics. Photograph, micrograph. (L general, Q29)

486-L. De-Icing With Sprayed Metal. *Electroplating and Metal Finishing,* v. 7; *Metal Spraying,* v. 4, Apr. 1954, p. 159, 161-163.

Theory, operation and production of Napier heating mat on aircraft. Alloy coating is sprayed on a resin base. Graph, photographs. 4 ref.
(L23)

487-L. The Fluorine and Chromium Contents of Treated Aluminium Surfaces. R. Holt. *Journal of the Science of Food and Agriculture,* v. 5, Apr. 1954, p. 173-176.

Studies indicate lacquered cans made from Alocrom-treated aluminum would not be dangerous to health. Tables. 6 ref. (L26, Al)

488-L. Nickel Plating Troubles and Cures. O. A. Stocker, A. Korbelak and S. A. Carrano. *Plating,* v. 41, May 1954, p. 491-496.

Lack of adhesion and ductility, dull, spotty, rough or streaky deposits, burnt edges and pitting. Chart. (L17, Ni)

489-L. Radiometric Study of the Chromium-Sulfate Complex Formed in Chromium Plating Baths. Ronald L. Sass and Stanley L. Eisler. *Plating,* v. 41, May 1954, p. 497-501.

Ionic nature of coordination complex formed and amount of sulfate so complexed. Tables. 11 ref. (L17)

490-L. A.E.S. Research Report: Project No. 6; Porosity of Electrodeposited Metals. XIII. Variation of the Gas Permeability Constant With Pressure Difference. N. Thon and Douglas Dean. *Plating,* v. 41, May 1954, p. 503-505.

Improved permeability apparatus by means of which measurements have been made over larger foil areas. Apparatus used to study variation of permeability as function of overpressure. Diagram, graphs. (L17)

491-L. (German.) **Testing Pickling Additions for Their Effectiveness.** Hubert Hoff and Georg von der Dunk. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 3-4, Mar.-Apr. 1954, p. 115-123.

Process determines inhibiting effect, stability and effects of time and dissolved iron on different inhibitors. Photographs, graphs, tables. 23 ref. (L12, Fe)

492-L. (German.) **Hydrogen Pick-Up of Austenitic Steels in a Cathodic Charge.** Friedrich Eisenkolb and Günter Ehrlich. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 3-4, Mar.-Apr. 1954, p. 187-194.

Effect of type of electrolyte, small additions of arsenic, lead, sulfur and selenium and conditions of electrolysis. Tables, graphs. 35 ref.
(L17, AY)

493-L. (German.) **Thickness of Nickel Deposits on Iron by Dissolution Process.** Gerhard Schikorr. *Metalloberfläche,* Ausgabe B, v. 6, no. 4, Apr. 1954, p. 49-51.

Principles of anodic and chemical dissolution processes with and without prime coatings. Tables. 6 ref.
(L19, Ni, Fe)

494-L. (German.) **Use of Hull Cell for Testing and Controlling Electrolytic Baths.** E. Gerber. *Metalloberfläche,* Ausgabe B, v. 6, no. 4, Apr. 1954, p. 51-53.

Principle, design and use of cell as means of testing current density of electrolytic baths and quality of deposits. Diagrams, graphs, table. 1 ref. (L17)

495-L. (German.) **Determinations of Fluosilicic and Hydroboric Acid and Organic Compounds in Electrolytic Baths.** Fred Karsten. *Metalloberfläche,* Ausgabe B, v. 6, no. 4, Apr. 1954, p. 53-55.

Methods of determining and controlling electrolytes including wetting agents. 2 ref. (L17, S11)

496-L. (German.) **Adhesiveness of Electrolytic Deposits.** Fritz Sautter. *Metalloberfläche,* Ausgabe B, v. 6, no. 4, Apr. 1954, p. 55-57.

Ollard, Knapp, Schlaupitz and Robertson's methods of testing. Attempts to eliminate extraneous factors such as tensile strength and thickness of deposit which tend to mask true results. Diagrams. 6 ref.
(L17)

497-L. (German.) **Methods of Measuring pH and rH in the Treating Industry.** H.-D. Schulz-Methke. *Metalloberfläche,* Ausgabe A, v. 8, no. 4, Apr. 1954, p. 61-64.

Importance and principles of measuring H ion concentration and redox potentials of electrolytes. Present status of equipment. Photograph, diagrams. (To be concluded.) (L17)

498-L. (Japanese.) **Studies on the Addition Agents Applied to the Electrodeposition of Metals. I. The Addition Agents Applied to the Electrodeposition of Copper From the Copper Sulphate Solution. II. Influence of Electrolytic Conditions Upon the Action of the Addition Agents.** Minoru Kikuchi and Harukazu Toyoda. *Reports of the Government Chemical Industrial Research Institute, Tokyo,* v. 49, no. 1, Jan. 1954, p. 31-38.

Experimental results. Tables, graphs. 10 ref. (L17, Cu)

499-L. (Japanese.) **Alkaline Degreasing of Metal Surface.** Minoru Kikuchi and Kikuma Oki. *Reports of the Government Chemical Industrial Research Institute, Tokyo,* v. 49, no. 2, Feb. 1954, p. 61-64.

Alkaline degreasing solutions were mixed with surface active agents (ionic or nonionic). Surface tensions of solution were lowered. Degreasing action was increased by mixing with nonionic surface active agent. Diagrams, graphs. 1 ref.
(L12)

500-L. (Japanese.) **Addition of Surface Active Agents to the Nickel Plating Bath. I. Pin Holes of the Plated Nickel. II. Properties of the Baths.** Minoru Kikuchi and Kikuma Oki. *Reports of the Government Chemical Industrial Research Institute, Tokyo,* v. 49, no. 2, Feb. 1954, p. 65-71.

Three kinds of agents were added to low and high-pH nickel baths. Hydrogen overvoltage of bath measured with Haring cell was increased by addition of agent. Tables, graphs. 4 ref. (L17, Ni)

501-L. (Russian.) **Mechanism of Electrodeposition Process of Chromium.** A. I. Levin, A. I. Falicheva, E. A. Ukshe and N. S. Brylina. *Doklady Akademii Nauk SSSR,* v. 95, no. 1, Mar. 1, 1954, p. 105-109.

Investigation of platinum, chromium, nickel, silver, copper and zinc cathodes for dependence of current strength on the potential. Graphs. 12 ref. (L17, Cr)

502-L. (Russian.) **Investigation of Certain Liquid Greases for Protection of Steel During Exploitation and Stor-**

age. V. V. Skorchelletti and V. E. Piskorskii. *Zhurnal Prikladnoi Khimii,* v. 27, no. 3, Mar. 1954, p. 314-318.
Addition of montan wax gave best results. Graphs, tables. 5 ref. (L26, ST)

503-L. (Book.) **Corrosion and Temporary Protectives.** 87 p. 1952. Shell-Mex House, Strand, London, W.C. 2.
Part I. Survey of mechanism of electrochemical attack. Part II: Account of petroleum-base temporary protective coatings; their selection, application and removal. (L26, R1)

504-L. (Book.) **Symposium on Porcelain Enamels and Ceramic Coatings as Engineering Materials.** 122 p. 1954. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $2.50.
Includes "Introduction", Dwight G. Bennett; "Some Examples of the Functional Use of Porcelain Enamel and Ceramic Coatings for Steel", G. H. Spencer-Strong; "Resistance of Porcelain Enamels to Weathering", Dwight G. Moore; "The Chemical Resistance of Glass Fused to Steel", E. A. Sanford and O. J. Britton; "Acid Resisting Properties of Porcelain Enamels", Harold C. Wilson; "Requirements for and Expected Benefits From the Application of Coatings to High-Temperature Components of a Jet Engine", A. C. Francisco and G. M. Ault; "High-Temperature Ceramic Coatings as Applied to Aircraft Power Plants", B. L. Paris; "The Industrial Processing of High-Temperature Ceramic Coatings", J. H. Terry; "The Abrasion Resistance of Various Types of Porcelain Enamel", Arthur V. Sharon; "The Resistance of Porcelain Enamels to Surface Abrasion as Determined by the PEI Test", John T. Roberts; "Torsion Testing as an Aid to the Porcelain Enamel Industry", E. L. Hoover; "The Strengthening Effect of Porcelain Enamel on Sheet Iron as Indicated by Bending Tests", E. E. Bryant; "Tension Tests of Porcelain Enameled Steel", W. A. Deringer; "Effect of Temperature on the Electrical Resistivity of Several Ceramic and Silicone-Type Coatings", Simon W. Strauss, Lloyd E. Richards, and Dwight G. Moore; "A Laboratory Evaluation of Ceramic Coatings for High Temperature Applications", Sara J. Ketcham; and "Guideposts in Selecting Porcelain Enamels and Ceramic Coatings. A Summary", W. N. Harrison. (L27)

505-L. (Book—German.) **Metal Surface Processing and Treatment Yearbook. (Jahrbuch der Oberefläechentechnik).** Phil. W. Wiederholt, editor. 10th Ed. 800 p. 1954. Metall Verlag G.m.b.H., Grunewald, Hubertusallee 18. Berlin, Germany. 5.40 DM.
General review of surface treatment techniques; measurement of hardness, brightness, roughness, and thickness; and new patents and processes. (L general, Q29, S14, S15)

M

Metallography, Constitution and Primary Structures

175-M. **Drift Mobilities in Semiconductors. II. Silicon.** M. B. Prince. *Physical Review,* v. 93, ser. 2, Mar. 15, 1954, p. 1204-1206.
Mobility of holes in *n*-type silicon and electrons in *p*-type silicon measured as functions of impurity concentration and temperature. Graphs. 3 ref. (M25, Si)

176-M. **Contribution to System Tungsten Carbide-Titanium Carbide-Chromium Carbide.** O. Rüdiger. *Henry Brutcher, Altadena, Calif., Translation no.* 3220, 7 p. (From *Metall,* v. 7, nos. 23-24, 1953, p. 967-969.)
Previously abstracted from original. See item 67-M, 1954. (M24, W, Ti, Cr)

177-M. (English.) **Origin of Spiral Eutectic Structures.** R. L. Fullman and D. L. Wood. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 188-193.
Structures in which two phases appear as intertwined spirals in cross section were observed in zinc-magnesium and aluminum-thorium alloys. Diagrams, graph, micrographs. 2 ref. (M27, N12, Zn, Mg, Al, Th)

178-M. (English.) **Thermodynamics of the Liquidus and the Solidus of Binary Alloys.** Carl Wagner. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 242-249.
If free energies of liquid and solid phase of binary alloy are given as functions of composition and temperature, liquidus and solidus may be derived from condition that partial molar free energies of each component must be equal in coexisting phases. 30 ref. (M24, P12)

179-M. (English.) **Oxide Growth on Different Crystal Faces of Aluminium.** S. J. Basinska, J. J. Polling and A. Charlesby. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 313-317.
Estimates of oxide thicknesses made by goniometer measurements and X-ray diffraction methods. Table, diagrams. 3 ref. (M26, M22, M23, Al)

180-M. (English.) **Recent Observations on the Motion of Small Angle Dislocation Boundaries.** Douglas W. Bainbridge, Choh Hsien Li and Eugene H. Edwards. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 322-333.
Boundaries in zinc crystals investigated in temperature range −196 to 400° C. Boundaries moved by application of shear stress. Photogoniometers, diagrams, photographs, graphs. 7 ref. (M26, Zn)

181-M. (English.) **On the Origin of Screw Dislocations in Growing Crystals.** *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 344-346.
Mechanism is suggested to arise from impingement of two crystals. 4 ref. (M26)

182-M. (English.) **Faulting in Austenite.** H. M. Otte. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 349-352.
Markings in austenite which delineate the (111) planes are best interpreted in terms of stacking faults, detectable by X-ray diffraction techniques. Micrographs, diagrams. 4 ref. (M26, M22)

183-M. (English.) **The Interaction of Impurity Atoms With Dislocations in Germanium.** A. D. Kurtz and S. A. Kulin. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 352-354.
Existence of dislocations in germanium gives rise to certain specific distributions of solute atoms. Approximate calculation and model is suggested. Table. 4 ref. (M26, Ge)

184-M. (English.) **Effect of Dislocations on Minority Carrier Lifetime in Germanium.** S. A. Kulin and A. D. Kurtz. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 354-356.
Densities measured by X-ray and metallographic methods. Results correlated with measurements of lifetime of minority carriers. Diagram, graph. 4 ref. (M26, P10, Ge)

185-M. (French.) **Electron Structure of Impurities in Metals.** J. Friedel. *Annales de physique,* v. 9, 12me Serie, Mar.-Apr. 1954, p. 158-202.
Configuration of electrons around an impurity studied with respect to molecular energy levels, valence energy levels and ion configurations. Graphs, diagrams, tables. 93 ref. (M25)

186-M. (French.) **Relation Between Structure and Mechanical Properties During the Hardening of Aluminum-Silver Alloy.** Bella Belbeoch and André Guinier. *Comptes rendus,* v. 238, no. 9, Mar. 1, 1954, p. 1003-1005.
X-ray study of an aluminum alloy with 38% silver. Graph. 3 ref. (M27, Q general, Al, Ag)

187-M. (French.) **Metallography of Cobalt-Base and Metallic-Carbide-Base Alloys.** René Bernard and Colette Berger. *Comptes rendus,* v. 238, no. 11, Mar. 15, 1954, p. 1224-1226.
Specimens were diamond polished and treated with hydrochloric and sulfuric acids and hydrogen peroxide. Constituents were readily distinguishable. Micrographs. 2 ref. (M27, M21, Co, Ni)

188-M. (French.) **Improvement in the Oxidation Method Enabling True Austenite Grains to be Revealed in Steel.** A. Kohn. *Revue de métallurgie,* v. 51, no. 2, Feb. 1954, p. 129-137.
Method overcomes drawbacks of cementation method. Procedure uses preferential diffusion of oxygen along austenite grain boundaries. Micrograph, table. 11 ref. (M27, ST)

189-M. (French.) **Effect of Additions of Zirconium on Crystal Structure of Extruded and Heat Treated Aluminum Alloy Semi-Finished Products.** J. Hérenguel and M. Scheidecker. *Revue de métallurgie,* v. 51, no. 3, Mar. 1954, p. 173-178.
Small additions produce satisfactory results for improved quality of semifinished products and widened scope of subsequent operations. Graphs, photographs, diagrams. 3 ref. (M26, Zr, Al)

190-M. (Russian.) **Calculation of Intensity of the X-Ray Background at Various Degrees of Correlation in Solid Solutions.** Iu. A. Bagariatskii. *Doklady Akademii Nauk SSSR,* v. 93, no. 1, Nov. 1, 1953, p. 35-38.
Verifies formula found by Lifshits and Obraztsov. Diffused maxima arise under clear selective maxima. 11 ref. (M22)

191-M. **Titanium-Nitrogen and Titanium-Boron Systems.** A. E. Palty. H. Margolin and J. P. Nielsen. *American Society for Metals, Transactions,* v. 46, 1954, p. 312-328.
On basis of metallographic, X-ray diffraction and melting-point data, Ti-N and Ti-B phase diagrams were delineated in respective composition regions up to 17.5% nitrogen and 33% boron. Graphs, micrographs, tables. 20 ref. (M24, Ti, B)

192-M. **The Phase Diagram of the System InAs-Sb.** C. Shih and E. A. Peretti. *American Society for Metals, Transactions,* v. 46, 1954, p. 389-396.
Thermal analysis, metallographic and X-ray data. Graph, table, micrographs. 7 ref. (M24, In, As, Sb)

193-M. **The Angular-Appearing Carbides in High Speed Tool Steels.** Carl J. McHargue, Joseph P. Hammond and Charles S. Crouse. *American Society for Metals, Transactions,* v. 46, 1954, p. 716-726.
Particles present in high speed toolsteels after overheating were studied in steels of types 18-4-1 and 6-5-4-2. They were found to be of same crystal structure and probably of similar composition as carbides ordinarily reported for these steels. Tables, micrographs, graph. 11 ref. (M26, TS)

194-M. **A Magnetic Method for the Determination of Gamma-Loops in Binary Iron Alloys and Its Applica-**

tion to the Iron-Silicon System. J. Crangle. *British Journal of Applied Physics,* v. 5, Apr. 1954, p. 151-154.

New method of phase analysis depends on measurements of paramagnetic susceptibility at different temperatures above the Curie point. Graphs, tables. 10 ref. (M24, M23, Fe)

195-M. Silver-Uranium System. R. W. Buzzard, D. P. Fickle and J. J. Park. *Journal of Research, National Bureau of Standards,* v. 52, Mar. 1954, p. 149-152.

Phase diagram constructed from data obtained by thermal analysis, metallographic examination and X-ray diffraction. Tables, graphs, micrographs, photograph. 5 ref. (M24, Ag, U)

196-M. X-Ray Diffraction Methods in the Appraisal of Nickel-Iron Powder-Cores. N. C. Tombs. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 197-201 + 6 plates; disc., p. 201.

X-ray techniques appraise magnetic powder cores made of 80-20 alloy by reduction process. Radiograms. (M22, P16, H11, Ni, Fe)

197-M. (German.) **The Three-Component System Titanium-Tungsten-Carbon.** Hans Nowotny, Erwin Parthé, Richard Kieffer and Friedrich Benesovsky. *Zeitschrift für Metallkunde,* v. 45, no. 3, Mar. 1954, p. 97-101.

Structure explained by X-ray diffraction and determination of melting points. Graphs, diagrams. 12 ref. (M24, Ti, W)

198-M. (German.) **Crystalline Form of Tungsten Carbide and the Distribution of Carbon Atoms in the Lattice.** Hans Pfau and Walter Rix. *Zeitschrift für Metallkunde,* v. 45, no. 3, Mar. 1954, p. 116-118.

Investigation indicated probable location of carbon atoms. Photographs. 3 ref. (M26, W)

199-M. (German.) **The Structure of Amorphous Antimony.** H. Richter, H. Berckhemer and G. Breitling. *Zeitschrift für Naturforschung,* v. 9a, no. 3, Mar. 1954, p. 236-252 + 2 plates.

Preparation by vapor-deposition. Studies by X-ray method. Diagrams, graphs, tables, photographs, micrographs. 31 ref. (M26, Sb)

200-M. (Russian.) **Investigation of Plastically Deformed Crystals by Means of a Narrow Beam of X-Rays.** E. V. Kolontsova. *Doklady Akademii Nauk SSSR,* v. 93, no. 5, Dec. 11, 1953, p. 795-798 + 1 plate.

X-ray diffraction photographs utilizing a glass diaphragm with a slit of 10 to 15 microns width. Materials studied were monocrystals of tin, cadmium, zinc, aluminum, nickel and silver chloride. Graph, micrographs. (M22, Sn, Cd, Zn, Al, Ni)

201-M. The Transition Metals and Their Alloys. W. Hume-Rothery and B. R. Coles. *Advances in Physics,* v. 3, Apr. 1954, p. 149-242.

Physical properties, atomic and co-valent radii, electro theory, alloys with aluminum and electronic structures. Graphs, tables, diagrams. 136 ref. (M25, P general)

202-M. X-Ray Anti-Reflections in Crystals. II. Calculation of the Integrated Reflection and Integrated Anti-Reflection for an Internal Reflection. G. N. Ramachandran. *Indian Academy of Sciences, Proceedings,* v. 39, sec. A, Feb. 1954, p. 65-80.

Mathematical study of variations in reflected and transmitted intensities with various factors such as absorption coefficient, structure factor asymmetry and thickness of crystal. 12 ref. (M26, P10)

203-M. Use of Electrons in the Examination of Metals. A. G. Quarrell. *Metal Treatment and Drop Forging,* v. 21, Apr. 1954, p. 153-160, 167.

Development of electron microscope and of its use by the metallurgist. Diagrams, radiograms. 14 ref. (M21)

204-M. (French.) **New Method of Etch Pit Formation on Iron Surfaces.** Jean Bardolle and Jean Moreau. *Comptes rendus,* v. 238, no. 13, Mar. 29, 1954, p. 1416-1418.

Tests conducted in aqueous solutions of NH_4CNS. Electrolytic method. Micrographs. 14 ref. (M21, Fe)

205-M. (German.) **The Electrochemical Processes in Electrolytic Separation of Structural Components of Steel With A.C. Current.** Walter Koch, Ilse Ramsauer and Mark v. Stackelberg. *Archiv für das Eisenhüttenwessen,* v. 25, nos. 3-4, Mar.-Apr. 1954, p. 93-106.

Deficiency of current yield in isolation with square wave a.c. current; effect of structure on this deficiency and different variables on voltage and current-density curves. Diagrams, graphs, micrographs. 26 ref. (M23, ST)

206-M. (Book.) **Applied Electron Microscopy.** Robert B. Fischer. 231 p. 1953. Indiana Univ. Press, Bloomington, Ind. $4.85.

Specimen preparation and description of representative pictures. Equations are given, and comparison made between electron and light microscopy. (M21)

207-M. (Book.) **The Crystalline State. The Determination of Crystal Structures.** H. Lipson and W. Cochran. v. III. 345 p. 1953. G. Bell & Sons, Ltd., London W.C.2, England. 50s.

Determination of structures and construction of electron density maps for deriving atomic positions. (M26)

208-M. (Book.) **Introduction to Electron Microscopy.** Cecil E. Hall. 451 p. 1953. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. $9.00.

Essential elements of physical theory. Microscope construction, nature of images and preparation of specimens and selected samples. (M21)

N

Transformations and Resulting Structures

153-N. Hardness and Microstructure of an Alpha-Beta Titanium Alloy Quenched From Temperatures in the Range 600°-1,000° C. A. Greenwood and W. Evans. *Metallurgia,* v. 49, no. 293, Mar. 1954, p. 124-126.

Minimum hardness at 700° C. and progressive increase to 950° C. Beta grain growth occurred after completion of alpha-beta transformation. Limited amount of reversion of beta to alpha took place on quenching. Table, graph, micrographs. (N6, N3, Q29, Ti)

154-N. Diffusion of Antimony in Silver. E. Sonder, L. Slifkin and C. T. Tomizuka. *Physical Review,* v. 93, ser. 2, Mar. 1, 1954, p. 970-972.

Diffusion coefficient of antimony tracers in single crystals of pure silver measured as function of temperature over range 468 to 942° C. Tables, graphs. (N1, Sb, Ag)

155-N. Diffusivity and Solubility of Copper in Germanium. C. S. Fuller, J. D. Struthers, J. A. Ditzenberger and K. B. Wolfstirn. *Physical Review,* v. 93, ser. 2, Mar. 15, 1954, p. 1182-1189.

Function of temperature in range 700 to 900° C., by resistivity and radioactivity methods. Results account for changes occurring in resistivity of germanium upon heat treatment. Diagram, graphs, radiographs, table. 35 ref. (N1, N12, P15, Ge, Cu)

156-N. Recrystallization of Germanium From Indium Solution. Jacques I. Pankove. *RCA Review,* v. 15, Mar. 1954, p. 75-85.

Upon cooling a germanium-in-indium solution in contact with solid germanium, germanium from the supersaturated solution recrystallized onto the solid crystal in epitaxial fashion. Micrographs, photographs, diagrams. 1 ref. (N5, Ge, In)

157-N. Spiral Growths on Large Crystal Surfaces. Helen Rae and A. E. Robinson. *Royal Society, Proceedings,* v. 222, ser. A, Mar. 23, 1954, p. 558-562 + 2 plates.

Cause of twinning occurring in lithium sulfate monohydrate crystals. Twinning is associated with condition of high supersaturation in nutrient solution and is frequently accompanied by spontaneous microcrystallization. Diagrams. 2 ref. (N12)

158-N. Formation and Properties of Delta Iron (Ferrite) and Sigma Phase in Austenitic Chromium-Nickel Steels. II. H. Buchholtz, H. Krächter and F. Kraemer. *Henry Brutcher, Altadena, Calif., Translation no.* 3151, 20 p. (From *Archiv für das Eisenhüttenwesen,* v. 24, nos. 3-4, 1953, p. 113-125.)

Previously abstracted from original. See item 196-N, 1953. (N8, P general, Q general, SS)

159-N. On the Primary Crystallization of Spheroidal Graphite Cast Iron. H. Gries and U. Maushake. *Henry Brutcher, Altadena, Calif., Translation no.* 3175, 19 p. (Condensed from *Giesserei, Technisch-Wissenschaftliche Beihefte,* 1953, no. 10, Mar., p. 493-502.)

Occurrence of graphite spheroids. Reviews literature on nuclei, crystal structure and crystallization process. Micrographs, table. 50 ref. (N12, CI)

160-N. Structural Changes in Metal During Creep. B. M. Rovinskii and L. M. Rybakova. *Henry Brutcher, Altadena, Calif., Translation no.* 3224, 15 p. (From *Izvestiya Akademii Nauk SSSR,* OTN, 1953, no. 9, p. 1241-1247.)

Studies Armco iron at 750 and 840° F. and titanium-stabilized 18-8 steel at 1065 and 1155° F. at various residual deformations ranging from 0 to 7%. Graphs, micrographs. 7 ref. (N general, Q3, Fe, SS)

161-N. (English.) **Grain Boundary Self-Diffusion in Zinc.** Edward S. Wajda. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 184-187.

Self-diffusion measured in temperature range 75 to 200° C. using Zn^{65} as tracer and usual lathe sectioning technique. Graphs, table. 7 ref. (N1, Zn)

162-N. (English.) **The Supersaturation and Precipitation of Vacancies During Diffusion.** R. W. Balluffi. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 194-202.

Metallographic evidence supports viewpoint that porosity formed during diffusion is produced by heterogeneous nucleation of supersaturated vacancies pumped into one side of diffusion zone by unequal

diffusion currents of Kirkendall effect. Micrographs, table. 12 ref. (N1)

163-N. (English.) **Diffusion of Hydrogen in Mild Steel.** Al. Demarez, Arthur G. Hock and Francis A. Meunier. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 214-223.

Apparatus can be used for rapid determination of total hydrogen content and diffusion coefficient. Graphs, tables, diagram. 25 ref. (N1, CN)

164-N. (English.) **The Crystallography of Martensite Transformations. III. Face-Centred Cubic to Body-Centred Tetragonal Transformations.** J. S. Bowles and J. K. MacKenzie. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 224-234.

Geometrical theory previously developed is applied. Predictions of habit planes, orientation relationships and other geometrical features are compared with experimental data for iron-carbon, iron-nickel and iron-nickel-carbon alloys. Graph, diagrams, tables. 22 ref. (N8, Fe, ST, AY)

165-N. (English.) **Spontaneous Deformation of Austenite During Martensitic Transformations.** B. Edmondson and T. Ko. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 235-241.

Metallographic examination shows plastic deformation takes place during transformations occurring in 34% nickel-iron alloy during heating and cooling. Micrographs. 16 ref. (N8, AY)

166-N. (English.) **The Effects of Certain Alloying Elements on the Allotropic Transformation in Titanium.** H. W. Worner. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 310-212.

Alloying elements with atomic sizes close to that of titanium considered. Change in enthalpy which accompanies transfer of 1 gr.-atom of any given solute from beta to alpha phase is used to indicate effect of solute on alpha $\rightleftharpoons$ beta transformation. Graph. 10 ref. (N6, Ti)

167-N. (English.) **The Rate of Growth of Dendrites in Supercooled Tin.** A. Rosenberg and W. C. Winegard. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 342-343.

Relates rate of growth of dendrites to degree of supercooling in a melt of tin. Graph. 2 ref. (N12, Sn)

168-N. (English.) **The Relation of the Disordering of a Super-Lattice to the Melting of the Disordered Alloy.** R. A. Oriani. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 343-344.

Constancy of ratio of critical temperature to solidus temperature is examined. Simple relation is shown. Table. 13 ref. (N10)

169-N. (English.) **An Equation for the Solubility Surface of Ternary "Sub-Regular" Solutions.** H. K. Hardy. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 348-349.

Mathematic analysis leading to equations defining the solubility curve. 4 ref. (N12)

170-N. (French.) **On the Mechanism of Diffusion in Solid Solutions.** C. Crussard. *Acta Mtallurgica,* v. 2, no. 2, Mar. 1954, p. 296-301.

By analyzing mechanism of thermal agitation and using theory based on interference of waves of thermal agitation, a satisfactory explanation of discrepancies in Arrhenius' law is possible. Graph. 7 ref. (N1)

171-N. (French.) **Investigations on the Texture of Orientation and the Allotropic Transformation of Cobalt.** Hervé Bibring and Francois Sebilleau. *Comptes rendus,* v. 238, no. 9, Mar. 1, 1954, p. 1026-1028.

Experiments on electrolytic cobalt with a purity greater than 99.5%, degassed at 1200° C. for five days prior to any mechanical or heat treatment. Graphs. 1 ref. (N6, Co)

172-N. (French.) **Present State of Metallography of Alloyed Austenites, Particularly in 18-8 Steels. III. Martensite-Type Reactions in Austenites Having a High Content of Alloying Elements.** Paul Bastien and Jacques Dedieu. *Métaux, Corrosion-Industries,* v. 29, no. 342, Feb. 1954, p. 49-56.

Graphic representation of anisothermal reaction. Cold-hardening and isothermal martensitic reactions at low temperatures. Graphs, micrographs. 26 ref. (N8, SS)

173-N. (French.) **Role of Surface Films on the Reaction of Zirconium With Hydrogen.** E. A. Gulbransen and K. F. Andrew. *Revue de métallurgie,* v. 51, no. 2, Feb. 1954, p. 101-107; disc., p. 107.

Current concepts of occlusion of hydrogen by metals. Compares hydrogen reaction for clean metal surfaces and for surfaces contaminated with oxide films. Tables, graphs. 10 ref. (N15, Zr)

174-N. (French.) **On the Equilibrium Between Carbon and Oxygen Dissolved in Liquid Iron.** Pierre Vallet. *Revue de métallurgie,* v. 51, no. 2, Feb. 1954, p. 115-128.

Causes of scatter of results analyzed. Errors in method and their avoidance. Tables, graphs. 5 ref. (N12, Fe)

175-N. (French.) **Study of Submicroscopic Precipitation in Heat-Resistant 80:20 Type Nickel-Chromium Alloys.** Y. Baillie and J. Poulignier. *Revue de métallurgie,* v. 51, no. 3, Mar. 1954, p. 179-190; disc., p. 190-191.

Method is delicate enough to give sharp pictures of precipitate developed. Micrographs, graphs. 8 ref. (N7, Ni, Cr)

176-N. (German.) **Formation of Spheroidal Graphite in Cast Iron by Washing the Melt With Argon.** P. König and B. Marincek. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 20, no. 2, Feb. 1954, p. 41-44.

Argon was passed into superheated melt. Table, micrographs. (N12, CI)

177-N. (German.) **Investigation of Rolling and Recrystallization Textures of Aluminum. I. Textures of Cold Rolled Pure Aluminum.** Kurt Lücke. *Zeitschrift für Metallkunde,* v. 45, no. 2, Feb. 1954, p. 86-92.

Compares results with those of other investigators. Diagrams. 16 ref. (N5, Q24, Al)

178-N. (Russian.) **Stabilization Phenomenon During Reverse Martensitic Transformation.** Ia. M. Golovchiner and Iu. D. Tiapkin. *Doklady Akademii Nauk SSSR,* v. 93, no. 1, Nov. 1, 1953, p. 39-42.

Stabilization effect of alpha phase. Investigates annealing of nickel-iron and nickel-titanium-iron alloys at 1100° C. for four hours, then cooling to −196° C. in liquid nitrogen. Graphs. 7 ref. (N8, N9, Ni, Fe)

179-N. (Russian.) **Problem of the Passive, Orienting Influence of a Solid Base on Growing Crystals.** P. A. Shumskii. *Doklady Akademii Nauk SSSR,* v. 93, no. 1, Nov. 1, 1953, p. 51-54.

Investigates passive-type crystal growth of polycrystalline aggregates applicable to petrographic studies and to conditions of crystallization of alloys. Diagrams. 5 ref. (N12)

180-N. (Swedish.) **The Effect of Deformation, Temperature, and Chemical Composition on the Formation of Martensite in Austenitic Stainless Steels.** Tryggve Angel. *Jernkontorets Annaler,* v. 138, no. 3. 1954, p. 117-141.

Experimental studies of isothermal martensite formation as a function of strain, stress and deformation energy. Graphs, micrographs, table, diagram. 28 ref. (N8, SS)

181-N. **A Precipitation-Hardenable Copper - Nickel - Silicon - Aluminum Alloy.** D. B. Roach, R. B. Fischer and J. H. Jackson. *American Society for Metals, Transactions,* v. 46, 1954, p. 329-345; disc., p. 346-347.

Alloy can be readily formed in solution-treated condition and hardened by aging to have a proportional limit of 85,000 psi., a yield strength of 120,000 psi. and a tensile strength of 140,000 psi., with an elongation of 8% and modulus of elasticity in tension of 19 million psi. Tables, graphs. 11 ref. (N7, Q23, Al)

182-N. **How Dissolved Nitrogen Affects Graphitization.** G. V. Smith. *Iron Age,* v. 173, Apr. 15, 1954, p. 136-139.

Nitrogen dissolved in aluminum killed steel inhibits graphitization. Instability of iron carbide is the graphitization problem. Table, micrographs, graph. (N8, ST)

183-N. **Structural Changes During Annealing of White Cast Irons of High S:Mn Ratios, Including the Formation of Spherulitic and Non-Spherulitic Graphite and Changes in Sulphide Inclusions.** Axel Hultgren and Gustaf Ostberg. *Iron and Steel Institute, Journal,* v. 176, Apr. 1954, p. 351-365 + 11 plates.

Mechanism of formation of dispersed graphite flake nests, compact nests and spherulites during annealing at 900 to 1150° C. studied by examining microstructures of quenched specimens. Graphs, diagrams, tables, micrographs. 20 ref. (N8, J23, CI)

184-N. **Eutectic Solidification in Grey, White, and Mottled Hypo-Eutectic Cast Irons.** A. Hultgren, Y. Lindblom and E. Rudberg. *Iron and Steel Institute, Journal,* v. 176, Apr. 1954, p. 365-374 + 8 plates.

Samples quenched at predetermined points on cooling curves. Sections examined for evidence of processes occurring during cooling. Micrographs, tables, graphs, diagrams. 6 ref. (N12, CI)

185-N. **Undercooled Graphite in Cast Irons and Related Alloys.** H. Morrogh and W. J. Williams. *Iron and Steel Institute, Journal,* v. 176, Apr. 1954, p. 375-378 + 2 plates.

Develops view that undercooled graphite is formed by decomposition of white iron structure shortly after solidification. Composition of silicocarbide. Graph, micrographs. 8 ref. (N8, CI)

186-N. **The Solidification of Iron-Phosphorus-Carbon Alloys.** H. Morrogh and P. H. Tütsch. *Iron and Steel Institute, Journal,* v. 176, Apr. 1954, p. 382-384 + 2 plates.

In place of normal ledeburite, phosphorus in small amounts causes formation of degenerate eutectic structure. In large amounts it gives rise to austenite dendrites and cementite of hyper-eutectic appearance. Table, diagram, micrographs. 4 ref. (N12, CI)

187-N. **Decomposition of Cementite During Solidification of Cast Iron.** A. Berman and V. Kondic. *Iron and Steel Institute, Journal,* v. 176, Apr. 1954, p. 385-387.

Origin of graphite in cast iron investigated by comparing time required for graphite to form on cooling with that required for cementite to decompose at eutectic temperature. Micrograph, graph, diagrams. 6 ref. (N12, CI)

188-N. Metallography of Delta-Ferrite. I. Eutectoid Decomposition of Delta-Ferrite. Kehsin Kuo. *Iron and Steel Institute, Journal,* v. 176, Apr. 1954, p. 433-441 + 4 plates.

Delta-ferrite in high-molybdenum steel decomposed in eutectoid manner within temperature range 900 to 1150° C., giving austenite and the Fe^3Mo^2C carbide. Suggests slow diffusion of molybdenum is controlling factor for three internally connected transformations. Micrographs, table, graphs. 28 ref.
(N9, AY)

189-N. (German.) **Determination of Melts and Classification of Solids Into "Volume Weak" and "Volume Strong" Solids at High Temperatures.** A. Knappwost and H. Restle. *Zeitschrift für Elektrochemie,* v. 58, no. 2, 1954, p. 112-118.

Definition of terms. Observations of solidification phenomena of various materials. Graphs, diagrams, table, photograph. 10 ref.
(N12, E25, Cd, Zn, Pb, Al)

190-N. (German.) **Diffusion Phenomena in Powder Metal Blanks.** Horst Schreiner and Johann Mariacher. *Zeitschrift für Metallkunde,* v. 45, no. 3, Mar. 1954, p. 108-111.

Contact method developed by R. Lindner using radioactive $silver^{110}$-copper. Table, graph, radiograph. 8 ref. (N1, H11, Ag, Cu)

191-N. (Russian.) **Influence of Carbon on the Self-Diffusion of Iron in the Iron-Nickel System.** P. L. Gruzin and E. V. Kuznetsov. *Doklady Akademii Nauk SSSR,* v. 93, no. 5, Dec. 11, 1953, p. 809-812.

Coefficients of self-diffusion measured by means of a radioactive Fe^{59} isotope in range from 800 to 1300° C. for alloys containing 20% nickel and in range from 1050 to 1330° C. for alloys containing 25% nickel. Tables, graphs. 4 ref. (N1, Fe, Ni)

192-N. (Russian.) **Influence of the Rate of Heating on the Recrystallization of Steel.** B. G. Sazonov. *Doklady Akademii Nauk SSSR,* v. 93, no. 5, Dec. 11, 1953, p. 817-820.

A new concept based on orientation and dimensional correspondence of transforming phases and emergence of internal stresses connected with volumetric effect during formation of the new phase. Micrographs. 5 ref. (N5, ST)

193-N. (Russian.) **Heats of Activation During the Diffusion of Boron Into Tungsten and Molybdenum.** G. V. Samsonov. *Doklady Akademii Nauk SSSR,* v. 93, no. 5, Dec. 11, 1953, p. 859-861 + 1 plate.

Specimens were heated in a boron bath from 900 to 1300° C. Results reveal same regularity as observed for variation of other physical properties with change incompleteness of the electron d-level of a transition metal and strength of retention of elecrons by a metalloid. Graph, table, micrograph. 3 ref.
(N1, P12, W, Mo, B)

194-N. Heat-Treatment of High-Speed Steel. IV. Transformations on Cooling From the Austenitising Temperature. S. G. Cope. *Metal Treatment and Drop Forging,* v. 21, Apr. 1954, p. 183-190, 204.

Transformation within certain temperature ranges, effect of holding metal at elevated temperatures on transformations during subsequent cooling and potentialities of isothermal heat treatments. Graphs, table. 24 ref. (To be continued.)
(N8, J26, TS)

195-N. The Transformation of Alpha-Iron to Gamma-Iron During Abrasion. R. P. Agarwala and H. Wilman. *Royal Society, Proceedings,* v. 223, ser. A, Apr. 22, 1954, p. 167-174 + 1 plate.

Abrasion of surface of an iron crystal, by a single 10-in. stroke on 0000 emery with light hand pressure, led to disorientated alpha-iron surface layer containing some randomly disposed gamma-iron. Results indicate a simpler mechanism of transformation than previously proposed. Diagrams, radiograms. 14 ref. (N8)

196-N. (English.) **Self-Diffusion in Liquid Indium.** G. Careri, A. Paoletti and F. L. Salvetti. *Nuovo cimento,* v. 11, ser. 9, no. 4, Apr. 1, 1954, p. 399-406.

Coefficient measurement in range 160 to 480° C. Results close to those for liquid mercury. Graphs, table. 11 ref. (N1, In)

197-N. (German.) **Research on Transformation Tendency and Hardenability of Steels.** Erich Greulich. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 3-4, Mar.-Apr. 1954, p. 137-149; disc., p. 149-152.

Minimum half-life of isothermal austenite transformation considered as a characteristic index. Time - temperature - transformation diagrams of six steels alloyed with chromium, molybdenum, nickel, silicon and vanadium determined. Graphs, tables, micrographs.
(N8, J26, AY, SS)

198-N. (German.) **Segregation Phenomena in a Chromium-Nickel Steel With 4.5% Nickel.** Werner Jellinghaus. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 3-4, Mar.-Apr. 1954, p. 165-167.

Magnetometric and metallographic study of steel heat treated up to 93 hr. in alpha-gamma transformation range to investigate segregation of nickel. Effect on mechanical properties. Table, graphs, micrographs. (N8, Q general, AY)

199-N. (Russian.) **Mechanism of the Influence of Silicon on Graphitization of Iron Alloys.** K. P. Bunin. *Doklady Akademii Nauk SSSR,* v. 95, no. 1, Mar. 1954, p. 97-100.

Formation of diffusion micropores in iron-silicon system. Graphs, micrograph. 19 ref. (N8, Fe, Si)

P

Physical Properties and Test Methods

208-P. Rapid Measurements of Thermal Diffusivity. G. E. McIntosh, D. C. Hamilton and W. L. Sibbitt. *ASME, Transactions,* v. 76, Apr. 1954, p. 407-409; disc., p. 409-410.

Apparatus and technique developed for determining thermal diffusivity of metals by a periodic heat-flow method. Graph, diagrams. 14 ref. (P11, Ti, Zr, Fe)

209-P. Electrical Properties of Microcrystalline Selenium. Gilbert Halverson. *Communication and Electronics,* 1954, Mar., p. 38-45.

Resistivity and temperature variation of resistivity for temperature range 25 to 150° C. on selenium samples conaining iodine. Table, graphs, micrographs. 7 ref.
(P15, Se)

210-P. Influence of pH on the Corrosion of Metals. (Digest of "Influence of pH on the Electrochemical Behavior of Metals and Their Corrosion Resistance", A. Ya. Shatalov; *Doklady Akademii Nauk SSSR,* v. 86, 1952, p. 775-777.) *Metal Progress,* v. 65, Apr. 1954, p. 174, 176, 178.

Previously abstracted from original. See item 437-P, 1953.
(P15, R general, Ag, Cu, Mg, Zn, Cd, Al, Pb, Sn, Bi, Mo, W, Mn)

211-P. Properties of Sintered Nickel Steels. (Digest of "Sintered Nickel Steels", F. Benesovsky; *Berg und Hüttenmännische Monatshefte,* v. 96, Sept. 1951, p. 184-187.) *Metal Progress,* v. 65, Apr. 1954, p. 200, 202, 204.

Previously abstracted from original. See item 30-P, 1952.
(P10, Q27, Q29, M27, AY)

212-P. Some Physical Properties of Metallic Plutonium. W. B. H. Lord. *Nature,* v. 173, Mar. 20, 1954, p. 534-535.

Includes transition temperatures, phase densities and coefficients of linear thermal expansion and electrical resistance. Tables.
(P11, P15, Pu)

213-P. Thermoelectric Power of Cold-Worked Copper at Low Temperature. M. J. Druyvesteyn and K. J. Blok van Laer. *Nature,* v. 173, Mar. 27, 1954, p. 591.

Thermoelectric force measured between wire drawn at room temperature and an annealed wire as function of temperature of hot junction. Cold junction was kept at liquid air temperature (83° K). Graphs. 2 ref.
(P15, Cu)

214-P. Measurement of the Hall Coefficient of Alpha and Beta-Brass. O. Gram Jeppesen. *Nature,* v. 173, Mar. 27, 1954, p. 591-592.

Measurements undertaken to determine if any pronounced change in Hall coefficient takes place when passing from alpha to beta-brass. Method employing d.c. was used. Graph. 4 ref. (P15, Cu)

215-P. Thermodynamic Properties of Liquid Sodium. John F. Lee. *Nucleonics,* v. 12, Apr. 1954, p. 74, 76-77.

Table at 5° F. temperature intervals over a temperature range 208 to 1500° F. Shows how data were obtained or calculated. Tables. 5 ref. (P12, Na)

216-P. Infrared Absorption, Photoconductivity, and Impurity States in Germanium. W. Kaiser and H. Y. Fan. *Physical Review,* v. 93, ser. 2, Mar. 1, 1954, p. 977-980.

Measurements for *p*-type germanium with gold and copper impurities were conducted at different temperatures. Graphs, table. 8 ref.
(P15, P17, Ge)

217-P. The Work Function of Irregular Metal Surfaces. T. J. Lewis. *Physical Society, Proceedings,* v. 67, no. 411B, Mar. 1, 1954, p. 187-200.

Image potential of an electron outside an irregular metal surface differs from that for an ideal plane surface. Importance in theory of electron emission from metals in practice is briefly discussed. Graphs. 15 ref. (P15)

218-P. Justification of the Use of Perturbation Theory in Metallic Conductivity. J. S. van Wieringen. *Physical Society, Proceedings,* v. 67, no. 411A, Mar. 1954, p. 206-216.

Correction terms for scattering by two centers are calculated and shown to be negligible for Fermi gas. Diagrams. 10 ref. (P11)

219-P. Nuclear Magnetic Resonance in Metallic Lithium and Sodium. H. Jones and B. Schiff. *Physical Society, Proceedings,* v. 67, no. 411A, Mar. 1954, p. 217-220.

Observed 'Knight-shifts' are in agreement with results of cellular-type calculations of electronic states in metallic lithium and sodium. Tables. 12 ref. (P16, Li, Na)

220-P. The Scattering of Slow Neutrons by Ferromagnetic Crystals. G. L. Squires. *Physical Society, Proceedings,* v. 67, no. 411A, Mar. 1954, p. 248-253.

Beam of filtered neutrons with wave length of 7.0 A was used to measure total cross section of nick-

el and iron as a function of temperature from 290 to 1170° K. Graphs, diagram. 12 ref. (P10, Fe, Ni)

221-P. **The Elastic Constants and Density of Palladium Silver Alloys.** F. E. Hoare and B. Yates. *Physical Society, Proceedings,* v. 67, no. 411B, Mar. 1, 1954, p. 266-267.

Exploratory investigation of Young's modulus, rigidity and density for a series of palladium-silver alloys, including the pure metals. Graphs. 6 ref. (P10, Q21, Pd, Ag)

222-P. **The Thermal Conductivity of Metals.** R. E. B. Makinson. *Physical Society, Proceedings,* v. 67, no. 411A, Mar. 1954, p. 290-291.

Investigates Sondheimer's equations on conductivity of a monovalent metal. 2 ref. (P11)

223-P. **Determination of Heat Capacity by Pulse Heating.** T. E. Pochapsky. *Review of Scientific Instruments,* v. 25, Mar. 1954, p. 238-242.

Method is advantageous over more conventional procedures in that the heating can be done so rapidly that thermal losses become a minor problem. Photograph, diagrams. 5 ref. (P12)

224-P. **An Apparatus for the Determination of the Solidus Temperatures of High-Melting Alloys.** R. A. Oriani and T. S. Jones. *Review of Scientific Instruments,* v. 25, Mar. 1954, p. 248-250.

Apparatus determines melting temperatures of alloys up to 2200° C. within 10° and precludes possibility of contamination from refractory container. Table, diagram, photograph. 3 ref. (P12)

225-P. **Contribution to the Theory of the Coercive Force of Steel.** E. Kondorskii. *Henry Brutcher, Altadena, Calif., Translation no.* 3221, 8 p. (From *Doklady Akademii Nauk SSSR,* v. 63, no. 5, 1948, p. 507-510.)

Previously abstracted from original. See item 3B-78, 1949. (P16, ST)

226-P. **On the Theory of the Coercive Force of Low Carbon Steels.** E. Kondorskii. *Henry Brutcher, Altadena, Calif., Translation no.* 3239, 6 p. (From *Doklady Akademii Nauk SSSR,* v. 68, no. 1, 1949, p. 37-40.)

Previously abstracted from original. See item 3B-276, 1949. (P16, CN)

227-P. (English.) **The Magnetic Susceptibility and Electronic Specific Heat of Transition Metals in Relation to Their Electronic Structure.** E. C. Stoner. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 259-273.

Collective electron treatment of specific heat and susceptibility. Expressions obtained for main relations in form suitable for application to experimental results. Graphs, tables. 37 ref. (P16, P12)

228-P. (English.) **The Effect of Lattice Anisotropy on Low-Temperature Specific Heat.** W. DeSorbo. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 274-283.

General analysis in terms of Debye theory. Lattice vibration specific heat of monatomic lattices, both isotropic and anisotropic, are compared in liquid hydrogen-liquid nitrogen temperature region. Graphs, tables. 73 ref. (P12)

229-P. (English.) **On the Energies of Alkali Halide Solid Solutions.** Väinö Hovi. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 334-339.

Heats of formation and evolution are calculated on basis of Wasastjerna's statistical theory for solutions, in which difference between interionic equilibrium distances of components is equal to or smaller than case of NaCl-NaBr. Tables, graphs. 41 ref. (P12)

230-P. (English.) **Electron and Photocurrents in Thin Films of ZrO_2.** D. A. Vermilyea. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 346-348.

Mechanism to account for observed variation. Probability of tunneling versus that of thermal excitation over a barrier is considered. Graphs. 3 ref. (P15, Zr)

231-P. (French.) **The Variation of Magnetic Permeability of Irons and Steels as a Function of Mechanical Stresses.** Jean Creusot. *Comptes rendus,* v. 238, no. 11, Mar. 15, 1954, p. 1203-1204.

Variation of magnetic induction of specimens subjected to constant magnetic field. 5 ref. (P16, Q25, CI, ST)

232-P. (French.) **The Overvoltage of Copper in a Solution of Copper Acetate.** Minko Balkanski. *Comptes rendus,* v. 238, no. 11, Mar. 15, 1954, p. 1221-1223.

Studies on an ordinary out-of-phase apparatus by measuring potential of a copper electrode on electrolytically polished copper plate dipped in a 10-molar solution of copper acetate. Graphs. 1 ref. (P15, Cu)

233-P. (German.) **Principles of Measuring Radiated Power. Wave Length Norms in the Visible Spectrum.** H. Korte. *Archiv für technisches Messen,* 1954, no. 218, Mar., p. 57-60.

Wave lengths of a variety of metals under different atmospheric conditions. Tables. 7 ref. (P17)

234-P. (German.) **The Magnetic Susceptibility of Chromium.** Friedrich Wagenknecht. *Zeitschrift für anorganische und allgemeine Chemie,* v. 275, nos. 1-3, Feb. 1954, p. 59-64.

Preparation, analysis and magnetic measurement of electrolytic chromium. Tables, graph. 16 ref. (P16, Cr)

235-P. (German.) **Antiferromagnetic States of Precipitates in the Cu-Fe System.** A. Knappwost. *Zeitschrift für Elektrochemie,* v. 58, no. 1, 1954, p. 65-66.

Magnetic measurements indicate relation to gamma state of the iron. 7 ref. (P16, Fe, Cu)

236-P. (German.) **The Temperature Dependence of Residual Resistance in Tungsten in Temperature Range of 14 to 373° K.** Erich Krautz and Hermann Schultz. *Zeischrift für Naturforschung,* v. 9a, no. 2, Feb. 1954, p. 125-129.

Investigates deviations from Matthiessen's rule of electrical resistance. Temperature-dependence of cold-deformed wires agrees with Kohler's theory. Graph, tables. 11 ref. (P15, W)

237-P. **Measurements on the Coercive Force of Ticonal Down to Liquid Helium Temperatures.** D. A. Lockhorst, A. van Itterbeek and G. J. van den Berg. *Applied Scientific Research,* v. 3, sec. B, no. 6, 1954, p. 451-455.

Hysteresis curves compiled for magnetic induction as function of magnetic field strength, up to saturation, at different fixed temperatures by means of ballistic induction method. Table, graphs, diagram. 8 ref. (P16, Ni, Co, Al, Fe)

238-P. **The Free Energy of Formation of Manganous Orthophosphate.** J. Pearson, E. T. Turkdogan and E. M. Fenn. *Iron and Steel Institute, Journal,* v. 176, Apr. 1954, p. 441-444.

Reduction of manganous orthophosphate by hydrogen studied within 680 to 870° C. Results used to calculate standard free-energy change. Graphs, tables. 12 ref. (P12, Mn)

239-P. **The Electronegativities and Some Electron Affinities of Copper, Zinc, and Gallium Subgroup Elements.** Aubrey P. Altshuller. *Journal of Chemical Physics,* v. 22, Apr. 1954, p. 765-766.

Thermochemical method is used in calculations. Results compared to Gordy's empirical method. Table. 7 ref. (P15, Ga, Cu, Zn)

240-P. **Exchange Energy of Electrons in Metals and Ionic Crystals.** John R. Reitz. *Journal of Chemical Physics,* v. 22, Apr. 1954, p. 595-598.

Energy of valence electrons in monatomic and diatomic crystals is computed in Bloch approximation for case where lowest electronic wave function in band shows considerable spatial variation. Graph. 11 ref. (P12)

241-P. **Magneto-Resistance of Copper to 150,000 Oersted at 4.2° K.** J. L. Olsen and L. Rinderer. *Nature,* v. 173, Apr. 10, 1954, p. 682.

Extends measurements at liquid-helium temperatures to field-strengths of approximately 150,000 oersted. Graph. 5 ref. (P16, Cu)

242-P. **Furnace Spectrum of Plutonium.** John G. Conway. *Optical Society of America, Journal,* v. 44, Apr. 1954, p. 276-278.

Spectrum from a modified King furnace was observed between 3476 and 6888 A. at temperatures of 2000 to 2600° C. Table, diagram, spectrogram. 3 ref. (P17, Pu)

243-P. **The Magnetic Susceptibility of Nd Metal.** J. F. Elliot, S. Legvold and F. H. Spedding. *Physical Review,* v. 94, ser. 2, Apr. 1, 1954, p. 50-51.

Susceptibility of neodymium over temperature range of 20.4 to 300° K. Low-field susceptibility at 20.4° K. is larger than predicted by low-temperature Curie-Weiss law and has a definite field dependence. Graph, table. 9 ref. (P16, Nd)

244-P. **Effect of Elastic Strain on the Electrical Resistance of Metals.** G. C. Kuczynski. *Physical Review,* v. 94, ser. 2, Apr. 1, 1954, p. 61-64.

Coefficients of electrical resistivity of 18 metals and alloys determined experimentally. For most metals, free electron theory accounts qualitatively for observed effects. Tables, graphs. 21 ref. (P15)

245-P. **Theoretical Remarks on the Influence of Slight Heterogeneous Impurities on the Initial Permeability of Nickel-Iron Alloys.** Martin Kersten. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 1-8; disc., p. 8.

Formula shows satisfactory agreement with experimental data. Graph, diagram. (P16, Ni, Fe)

246-P. **Coercivities in Dilute Ferromagnetic Alloys.** G. Bate, D. Schofield and W. Sucksmith. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 9-13; disc., p. 13-14.

Tests on 12% chromium, 12% nickel stainless steel and copper-cobalt alloys containing 0.5 to 2.0% cobalt. Graphs, table. (P16, SS, Cu)

247-P. **The Influence of Subdivision Into Elementary Domains on the High-Frequency Permeability of Ferromagnetic Conducting Bodies.** L. Néel. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 15-18.

Theoretical computation based on superficial layers composed of elementary domains. Graphs. (P16)

248-P. **The Cardinal Magnitudes of Technical Magnetization.** G. C. Richer. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 19-26.

Model based on integration of two normal Gaussian distributions illustrates "eddy-loss" anomaly can be related to shape of hysteresis loop. Tables. (P16)

249-P. Iron Losses Under Superimposed Alternating Inductions. J. Greig and H. V. Shurmer. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 27-36; disc., p. 36-37.

Shows total loss may be greater or less than sum of losses when reentrant minor loops are formed. Graphs, diagrams, table. (P16, Fe)

250-P. Non-Linearity in Magnetic Core Materials at Low Field Strengths. K. E. Latimer. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 38-49; disc., p. 49-50.

Theoretical survey of types of nonlinearity to be expected. Ferrites included. Diagrams, graph. (P16, Fe)

251-P. Frequency-Dependence of Magnetization Processes in Ferrites and Its Relation to the Distortion Caused by Ferrite Cores. H. P. J. Wijn. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 51-62; disc., p. 62-63.

Magnetization curves of ferrites measured as function of frequency. Two dispersion mechanisms found. Graphs, table. (P16, Fe, Zn)

252-P. Physical Aspects of Losses in Soft Magnetic Materials. D. Polder. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 74-82; disc., p. 82-89.

Unambiguous classification into hysteresis, eddy-current, and residual losses is difficult. Ignorance of process results in unsatisfactory definitions. Tables, graphs. (P16, SG-p)

253-P. Ferromagnetic Resonances, Hysteresis and Residual Losses in Ferrites and Metals. F. F. Roberts. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 90-95; disc., p. 95, 82-89.

Attempts to connect theory of spin-precision resonance and domain-wall resonance inside magnetic domains. (P16)

254-P. Relaxation Phenomena in Carbonyl Iron. T. A. Dunton. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 96-106; disc., p. 86, 106.

Magnetic after-effects occurring in carbonyl iron and theory of temperature-dependent after-effects. Graphs, table. (P16, Fe)

255-P. Richter-Type After-Effect of the Permeability in Silicon-Iron Laminations. R. Feldtkeller. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 107-118; disc., p. 86, 119.

After-effect is accompanied by limiting of initial field strength for smallest Barkhausen jumps and an anomalous hysteresis-free increase of permeability with amplitude of a.c. field. Diagrams, graphs. (P16, Si, Fe)

256-P. Jordan-Type After-Effect (Residual Loss) in Powder-Cores. R. Feldtkeller. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 120-128; disc., p. 86, 129.

Method suggested by Jordan for separating the eddy current and residual losses is critically analyzed. Graphs. (P16)

257-P. The Thermal-Agitation After-Effect. J. C. Barbier. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 130-134; disc., p. 86.

Analyzes hypothesis stated by Néel. Measurements of variations of magnetization as function of time throughout hysteresis range show existence of irreversible after-effect. Tables, diagram. (P16)

258-P. A Study, With the Aid of Electropolishing, of the Behaviour of Soft Magnetic Materials Over a Wide Frequency Range. I. Epelboin. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 135-144; disc., p. 188.

Deals with nickel-iron alloys having low magnetostriction. Behavior at radio frequencies and results of polishing. Graphs. (P16, Fe, Ni)

259-P. On the Theory of Residual and Stratification Losses. A. Fairweather. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 145-152.

Conventional theory of eddy losses in magnetic materials criticized. Stratification loss for a few core shapes at frequencies such that shielding is negligible. Graph, diagrams. (P16)

260-P. A Calorimetric Method of Finding the Total Loss in Ferromagnetic Specimens Subjected to an Alternating Magnetic Field. L. F. Bates, A. V. Davies and D. J. Harper. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 153-159; disc., p. 159-160.

Direct method measures total heat losses in strip, tube or rod specimens under conditions of high flux-density. Diagrams, graphs. (P16, SG-p)

261-P. A Screening-Factor Technique for Permeability Determination and Some Experimental Results. F. F. Roberts. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 161-171; disc., p. 171.

Simple probe units for impressing and picking up exploring wave. Theory of attenuation caused by insertion of specimen outlined. Tables, diagram. (P16)

262-P. Irreversible Magnetic-Viscosity Effects. R. Street and J. C. Woolley. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 172-182.

Theory of activation energy of irreversible magnetic viscosity is applied to two cases of varying fields. Graphs, diagrams. (P16)

263-P. The Assessment of Inhomogeneity in Thin Strips of High-Permeability Alloys. A. C. Lynch. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 183-187; disc., p. 187-190 + 1 plate.

Permeability of layers near surface of strips measured using frequencies so high that flux penetrates no further than layers in question. Tables, micrograph. (P16, Fe, Ni)

264-P. Some Problems of Oscillographic Measurement of Characteristics of "Rectangular"-Loop Magnetic Materials. G. R. Jackson, W. S. Melville and D. W. R. Sewell. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 191-196.

Techniques for determining a.c. dynamic characteristics. Diagrams. (P16, SG-p)

265-P. Experimental Investigations on Nickel-Molybdenum-Iron Alloys With Extremely High Initial Permeability. Fritz Assmus. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 218-224.

Reproduction of Supermalloy, "softest" magnetic material. Shows similar effects can be obtained with other alloys. Graphs. (P16, Ni, Fe, Cu, Mo)

266-P. The Properties and Potentialities of Cold-Reduced Nickel-Iron. W. F. Randall and H. H. Scholefield. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 225-232 + 3 plates.

Effect of progressive cold reduction on structure and magnetic properties of 50-50 and 80-20 alloy types. Graphs, tables, micrographs. (P16, Ni, Fe)

267-P. Some Chemical and Physical Properties of Iron Powders and Their Effects on the Magnetic Properties. C. E. Richards. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 233-242; disc., p. 242-246.

Study of influences controlling performance of iron powder. Pointers to be considered in future work. Tables, graphs. (P16, H11, Fe)

268-P. Factors Influencing the Measured Value of Hysteresis Loss of Powder-Cores. P. R. Bardell. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 253-257; disc., p. 257-258.

Influence of flux-density, magnetic history, annealing, insulant, particle-size and internal discontinuities in particles. Tables. (P16, H11, SG-p)

269-P. Some Properties and Applications of Silicon-Iron. J. McFarlane and N. F. Mole. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 259-267.

Reviews important properties of nonoriented and oriented alloys and application to magnetic circuits. Graphs, diagrams. (P16, T1, Si, Fe)

270-P. A Laminated Flake-Iron Powder Material for Use at Audio and Ultrasonic Frequencies. G. Campbell and F. J. Wood. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 268-277 + 2 plates.

Material in present form, method of manufacture, and properties and applications. Micrographs, photograph, graphs, table. (P16, H11, T1, Fe)

271-P. Some Pulse Tests on Magnetic Specimens Having Rectangular Hysteresis Loops. P. F. Dorey. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 286-299; disc., p. 299-300.

A circuit theory based on eddy currents flowing within a core is ideally expressed. Helps predict time and energy required to saturate a core and limiting conditions for flux transfer. Graphs, diagrams. (P16, SG-p)

272-P. Magnetic Cores for Instrument Transductors. A. E. De Barr and E. H. Frost-Smith. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 301-312.

Core material should have high permeability, sharp saturation and good linearity. Proposed figure-of-merit is shown to assess available materials reasonably. Graphs, table. (P16, SG-p)

273-P. Some A.C. Measurements on a Material Having a Rectangular Hysteresis Loop. S. E. Buckley, G. A. Jackson and A. G. F. Thomas. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 313-319; disc., p. 319-321.

Analysis of core-loss coefficients at low values of applied field shows eddy-current loss is greater than expected while hysteresis-loss coefficient increases with frequency. Tables, graphs. (P16, Ni, Fe)

274-P. The Magnetostriction of Ferrites. P. Popper. Paper from "Soft Magnetic Materials for Telecommunications". Pergamon Press Ltd., p. 322-332.

Ferrites compared with nickel. Equations and properties of ring vibrating in radial mode. Diagrams, graphs, tables. (P16, Ni)

275-P. (English.) **Thermodynamical Theory of Galvanomagnetic and Thermomagnetic Phenomena. I. Reciprocal Relations in Anisotropic Metals.** R. Fieschi, S. R. De Groot and P. Mazur. *Physica,* v. 20, no. 2, Feb. 1954, p. 67-76.

Relations derived for heat and electric conduction, and cross-effects in presence of a magnetic field. 11 ref. (P16)

276-P. (French.) **Electrochemical Dissolution of a Metal in Presence of an Anion That Precipitates the Metallic Cation Formed. Equation of Polarization Curve.** J. Badoz-Lambling. *Bulletin de la société chimique de France,* 1954, no. 3, Mar., p. 370-375.

Studies of silver halogenides were in qualitative agreement with established equations. Tables, graphs. 21 ref. (P13)

277-P. (French.) **Paramagnetism and Distribution of Electrons in Definite Compounds $NiAl_3$, $CoAl_4$, $FeAl_3$, $MnAl_6$, and $CrAl_7$.** Gabriel Foex and Jules Wucher. *Comptes rendus,* v. 238, no. 12, Mar. 22, 1954, p. 1281-1283.

Results of magnetic measurement to determine negative valence. Tables. (P16, Ni, Al, Mn, Co, Fe, Cr)

278-P. (French.) **Measuring Absolute Temperature of a Metallic Conductor From Electric Voltage Produced by Agitation of Electrons.** Roger Aumont, Jacques Romand and Boris Vodar. *Comptes rendus,* v. 238, no. 12, Mar. 22, 1954, p. 1293-1296.

Principle, apparatus and results of measurements to 780° K. Graph. 1 ref. (P15)

279-P. (French.) **Magnetic and Dilatometric Study of $CeMg_3$ Formation.** Francoise Gaume - Mahn and Micheline Cohen. *Comptes rendus,* v. 238, no. 12, Mar. 22, 1954, p. 1302-1303.

$CeMg_3$ prepared by prolonged heating of mixture of CeMg and $CeMg_9$ below 600° C. Existence of $CeMg_2$ indicated by sharp changes in magnetic and expansion coefficients. Graph. 4 ref. (P16, Ce, Mg)

280-P. (French.) **Alpha Magnetic Spectrum of Thorium C and Thorium C'.** A. Rytz. *Journal des recherches du centre national de la recherche scientifique,* 1953, no. 25, Dec., p. 254-256.

Confirms existence of alpha[5] in alpha-spectrum of thorium C. Energies and intensities of all alpha-groups of thorium B and C. Table, diagrams. 9 ref. (P16, Th)

281-P. (German.) **The Eddy-Current Anomaly in Sheet-Metal Cores.** Günther Sorger. *Frequenz,* v. 8, no. 3, Mar. 1954, p. 83-91.

Effects of eddy current on complex permeability computed. Frequent deviations from computed values are caused by inhomogeneity of local permeability and by zonal structure of ferromagnetism. Diagrams, graphs, table. 12 ref. (P16)

282-P. (German.) **Ionization by Strong Electrical Fields.** F. Kirchner. *Naturwissenschaften,* v. 41, no. 6, 1954, p. 136-137.

Study of adsorption of gases on metal surfaces reveals spontaneous ionization of adsorbed atoms and emission of electrons from adsorbed gas film. Graphs, micrograph. 10 ref. (P15)

283-P. (German.) **Paramagnetism During Precipitation in the System Copper-Iron.** Adolf Knappwost. *Zeitschrift für Metallkunde,* v. 45, no. 3, Mar. 1954, p. 137-142.

Magnetic moments of iron ions in copper lattice. Diagram, graphs, tables. (P16, Cu, Fe)

284-P. (German.) **Theory of Internal Field Emission of Cubic Crystals.** J. Homilius and W. Franz. *Zeitschrift für Naturforschung,* v. 9a, no. 3, Mar. 1954, p. 205-210.

Computation of disruptive strengths of body and face-centered crystals applied to various semiconductors. Field strengths are indicated. 10 ref. (P15, Pb, Si, Ge)

285-P. (German.) **Experimental Proof of the Semiconducting Character of Compounds CdTe and In_2Te_3.** J. Appel. *Zeitschrift für Naturforschung,* v. 9a, no. 3, Mar. 1954, p. 265-267.

Preparation of specimens and measurement of electrical conductivity of specimens from room temperature to 900 and 1100° K. Shows that saturation of outer atomic shells of each element imparts a distinct semiconducting character. Diagram, graphs. 4 ref. (P15, Cd, Te, In)

286-P. (German.) **Magnetization of Extremely Thin Iron Films.** W. Reincke. *Zeitschrift für Physik,* v. 137, no. 2, 1954, p. 169-174.

Vapor-deposited films were suspended on a silk fiber in magnetic field. Magnetic susceptibility computed from the duration of oscillations, moment of inertia of the glass plate and volume of deposited iron. Diagram, graphs. 15 ref. (P16, Fe)

287-P. (German.) **Ferromagnetism and Band Structure of the Transition Metals.** F. Bader, K. Ganzhorn and U. Dehlinger. *Zeitschrift für Physik,* v. 137, no. 2, 1954, p. 190-199.

Method designed explains that mathematics fails to show quantum-theoretically assumed abnormal change of the signs of the *d*-functions of ferromagnetic states. Diagrams, graphs, tables. 36 ref. (P16)

288-P. (German.) **Solubility of Hydrogen in Alloys. I. Method of Measuring and Investigation of $MgCu_2$-$MgZn_2$ and $MgNi_2$-$MgZn_2$ Systems.** K. H. Lieser and H. Witte. *Zeitschrift für physikalische Chemie,* v. 202, no. 5-6, Jan. 1954, p. 321-351.

Volumetric method of measuring solubility as function of time at constant pressure permits study of kinetic processes. Tables, graphs, diagram. (P13, Mg, Cu, Zn, Ni)

289-P. (German.) **Magnetic Susceptibilities of Ternary Magnesium Alloys and Their Importance From the Standpoint of the Electron Theory of Metals.** H. Klee and H. Witte. *Zeitschrift für physikalische Chemie,* v. 202, nos. 5-6, Jan. 1954, p. 352-378.

Brillouin's zone model explains susceptibility of electron gases. Results indicate a paramagnetic effect corresponding to anomalous diamagnetism. Tables, graphs, diagrams. 27 ref. (P16, Mg, Cu, Al, Si, Zr)

290-P. (Russian.) **Analysis of the Magnetization of Finite Ferromagnetic Cylinders in Constant Fields by the Method of the Theories of Dimensions and of Similarity.** V. G. Vitol and I. M. Kirko. *Doklady Akademii Nauk SSSR,* v. 93, no. 5, Dec. 11, 1953, p. 807-808.

Experimental data on cylinders of Armco iron, toolsteel and Steels A-12 and U-10. Graphs. 9 ref. (P16, Fe, TS, ST)

291-P. Kinetics of the Reaction of Hydrogen With Zirconium. Jack Belle, B. B. Cleland and M. W. Mallett. *Electrochemical Society, Journal,* v. 101, May 1954, p. 211-214.

Rate of reaction was determined for temperature range of 250 to 425° C. at one atmosphere pressure. Diagram, graphs, table, micrograph. 9 ref. (P13, Zr)

292-P. A Refinement of the Pauling Theory of Ferromagnetism. Gary Felsenfeld. *National Academy of Sciences of the United States of America, Proceedings,* v. 40, Mar. 1954, p. 145-149.

Method of modifying theory to take into account nonuniform electron density. Table. 2 ref. (P16)

293-P. The Phase Transition in Superconductors. III. Phase Propagation Below the Critical Field. T. E. Faber. *Royal Society, Proceedings,* v. 223, ser. A, Apr. 22, 1954, p. 174-194.

If superconducting nucleus is created at one end of a long rod of supercooled tin, it grows down to other end with a velocity of order 10 cm. per sec. Quantitative theory developed. Graphs, tables. 17 ref. (P15, N6, Sn)

294-P. (German.) **Sonic Velocities and Elastic Constants of Heterogeneous Substances.** H. Mandel. *Acustica,* v. 4, no. 2, 1954, p. 333-340.

Velocity of propagation of longitudinal and transverse waves in solid bodies measured by pulse method. Material constants derived. Application to alloys. Diagrams, graphs, photograph. 8 ref. (P10, Q21)

295-P. (German.) **The Disruptive Discharge Potential of Passive Iron-Chromium Alloys in Sulfate Solutions.** Georg Masing, Theo Heumann and Heinz Jesper. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 3-4, Mar.-Apr. 1954, p. 169-179; disc., p. 179-180.

Anodic behavior of iron, platinum, iron-chromium alloys and steel with 9.9% nickel and 18% chromium. Current density-voltage curves in potassium sulfate and sulfuric acid solutions measured at 20, 45 and 70° C. Voltage curve investigated as function of time. Graphs, tables. 11 ref. (P15, Fe, Pt, SS)

296-P. (Hungarian.) **The Application of Thermodynamic Functions to Metallurgy. II.** Aurél Horvath. *Kohaszati Lapok,* v. 9, no. 3, Mar. 10, 1954, p. 109-114.

Variation of entropy function with volume, pressure and temperature. Application of function to solution of problems. Tables. (P12)

297-P. (Russian.) **Theory of Anomalous Skin Effect in a Magnetic Field.** M. Ia. Azbel and M. I. Kaganov. *Doklady Akademii Nauk SSSR,* v. 95, no. 1, Mar. 1, 1954, p. 41-44.

Reflection of a plane monochromatic wave from the surface of a metal in a permanent magnetic field. 4 ref. (P16)

Q

Mechanical Properties and Test Methods; Deformation

415-Q. The Problem of Thermal Stresses in Aircraft Structures. E. Loveless and A. C. Boswell. *Aircraft Engineering,* v. 26, Apr. 1954, p. 122-124.

Review of various heat sources and sinks, and temperature effects on metals used in structures. Graphs, diagrams. (Q25)

416-Q. Mechanical Aspect of Seizing in Metal Wear. Harry Czyzewski. *ASME, Transactions,* v. 76, Apr. 1954, p. 381-385.

Accounts for accelerated mechanical abrasion. Mechanical analysis explains failure of externally lubricated alloys to equal performance of self-lubricated alloys. Micrographs, photographs, diagrams. 2 ref. (Q9)

417-Q. Most Recent Developments in Rope Testing at the Ontario Research Foundation. O. W. Ellis, M. A. Slaats, K. J. Frampton and H. A. Ellis. *Canadian Mining and Metallurgical Bulletin,* v. 47, no. 503, Mar. 1954, p. 170-182; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 57, 1954, p. 102-114.

Equipment and techniques of experimental testing. Tables, photograph, graphs, diagrams.
(Q general, CN)

418-Q. Hardness of Solids. D. Tabor. *Endeavour,* v. 13, Jan. 1954, p. 27-32.

Indentation hardness of metal is related to its plastic yield-stress. Extension of work provides very simple physical explanation of familiar Mohs scratch-hardness scale for minerals. Graphs, tables, photographs. 14 ref. (Q29)

419-Q. Recording Signals From Resistance Strain Gauges. I. Introduction and Galvanometer Design. II. Operation of Wire Resistance Strain Gauges at High Power Dissipation. D. A. Senior. *Engineer,* v. 197, Mar. 19, 1954, p. 410-413; Mar. 26, 1954, p. 446-449.

Mounted on ¼-in. steel sheet, gages show no sign of mechanical breakdown at power dissipations of one watt. Power ratings are such that recording of dynamic strains by galvanometers is practical without recourse to amplifiers. Diagrams, graphs. 2 ref. (To be continued.) (Q25)

420-Q. Recording Signals From Resistance Strain Gauges. III. A Twelve-Channel Direct Strain Recorder. D. A. Senior. *Engineer,* v. 197, Apr. 2, 1954, p. 482-483.

Instrument employs 12 galvanometers, each covering a frequency range extending from zero to 55 cycles per sec. and consists of a recorder control unit and a power unit. Photographs, diagrams. (Q25)

421-Q. Some Unsolved Technical Problems. *Engineering,* v. 177, Mar. 19, 1954, p. 367-369.

Lists problems industries should attempt to solve, including stress corrosion cracking, fatigue damage and notch sensitivity. (Q7, Q23, R1)

422-Q. The Forgeability, Creep Strength, and Ductility of Molybdenum and Some of Its Alloys. J. H. Rendall, S. T. M. Johnstone and W. E. Carrington. *Institute of Metals, Journal,* v. 82, Apr. 1954, p. 345-360 + 2 plates.

Short review of previous work, experimental techniques, effects of alloying elements on forgeability and creep strength and effect of processing variables and alloying additions on ductility. Photograph, tables, micrographs, diagram, graphs. 27 ref. (Q3, Q23, Q24, Mo)

423-Q. Factors Influencing Brittleness in Aluminium-Magnesium-Silicon Alloys. I. R. Harris and P. C. Varley. *Institute of Metals, Journal,* v. 82, Apr. 1954, p. 379-393 + 2 plates.

Effect of composition, heat treatment, cold work and structure on brittleness and mechanical properties of a series of wrought aluminum-magnesium-silicon alloys containing 0 to 2% silicon and 0 to 2% magnesium. Micrographs, photographs, tables, diagrams, graphs. 25 ref. (Q23, Al)

424-Q. Studies on the Creep Recovery and Annealing of Zinc Single Crystals. M. Tanenbaum and W. Kauzmann. *Journal of Applied Physics,* v. 25, Apr. 1954, p. 451-458.

Factors involved in recovery by pure zinc single crystals at 35° C. and the ability to creep following plastic deformation. Phenomenon in which pure zinc single crystals are consistently found to become temporarily hardened by annealing in vacuum above 200 to 260° C. Graphs, table. 14 ref.
(Q3, Q24, J23, Zn)

425-Q. Interpretation of Photoelastic Transmission Patterns for a Three-Dimensional Model. D. C. Drucker and W. B. Woodward. *Journal of Applied Physics,* v. 25, Apr. 1954, p. 510-512.

Work on photoelastic determination of quenching stresses is reexamined and extended. Diagrams. 2 ref. (Q25)

426-Q. Propagation of Longitudinal Deformation Waves in a Prestressed Rod of Material Exhibiting a Strain-Rate Effect. Robert J. Rubin. *Journal of Applied Physics,* v. 25, Apr. 1954, p. 528-536.

Mathematically longitudinal propagation of stresses above yield stress in material exhibiting strain-rate effect. 16 ref. (Q24)

427-Q. Stress Analysis in Design. II. Limitations of Theoretical Methods. J. B. Hartman and R. E. Benner. *Machine Design,* v. 26, Apr. 1954, p. 186-195.

Factors that limit reliability or applicability. Diagrams, graphs, photographs. 19 ref. (Q25)

428-Q. Materials for High Temperature Service. H. R. Clauser. *Materials & Methods.* v. 39, Apr. 1954, p. 117-132.

Superalloys, irons and steels, light metals, ceramics and cermets, plastics and copper and copper alloys. Photographs, graphs, tables. 11 ref.
(Q general, P general, SG-h, Cu)

429-Q. Plane Plasticity. B. B. Hundy. *Metallurgia,* v. 49, no. 293, Mar. 1954, p. 109-118.

Fundamental ideas of theory of plasticity as basis for understanding more useful parts of theory. Diagrams, photographs, graphs, table. 43 ref. (Q23)

430-Q. Endurance Limit of Zirconium. W. P. Wallace and R. N. Wallace. *Metal Progress,* v. 65, Apr. 1954, p. 128-129.

Mechanical properties of crystal-bar zirconium including rotating-beam fatigue data. Micrographs, graph, drawing. (Q7, Zr)

431-Q. The Effect of Compressive and Shearing Forces on the Surface Films Present in Metallic Contacts. M. Cocks. *Physical Society, Proceedings,* v. 67, no. 411B, Mar. 1, 1954, p. 238-248.

Two electrical methods were used to examine extent to which oxide or other natural surface films can prevent intermetallic contact when metal bodies are pressed together. Graphs, diagram. 16 ref. (Q28, Q2)

432-Q. Mohs's Hardness Scale—A Physical Interpretation. D. Tabor. *Physical Society, Proceedings,* v. 67, no. 411B, Mar. 1, 1954, p. 249-257.

Suggests relation exists between Mohs's hardness and indentation hardness of minerals. Graphs, diagram. 14 ref. (Q29)

433-Q. The Behaviour of Aluminium Deformed Under Alternating Stresses. N. Louat and M. Hatherley. *Physical Society, Proceedings,* v. 67, no. 411B, Mar. 1, 1954, p. 260-261.

In specimen, slip occurs in second-half cycle on those planes which were operative in first-half cycle, but only at stresses considerably in excess of maximum stress applied in first-half cycle. Light microscope was used. 1 ref. (Q24, Al)

434-Q. Exhaust Valve Maladies. J. A. Newton, J. L. Palmer and V. C. Reddy. *SAE Journal,* v. 62, Apr. 1954, p. 36-40.

Factors affecting diesel-valve fractures and suggested corrections. Tables, photographs, diagrams.
(Q26, S21)

435-Q. Results of Edge-Compression Tests on Stiffened Flat-Sheet Panels of Alclad and Nonclad 14S-T6, 24S-T3, and 75S-T6 Aluminum Alloys. Marshall Holt. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3023, Apr. 1954, 18 p.

Investigates compressive strengths of stiffened-flat-sheet panels including range where ultimate strengths approach compressive yield strengths of materials. Graphs, photographs, tables, diagrams. 3 ref. (Q28, Al)

436-Q. Experimental Investigation of the Pure-Bending Strength of 75S-T6 Aluminum-Alloy Multiweb Beams With Formed-Channel Webs. Richard A. Pride and Melvin S. Anderson. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3082, Mar. 1954, 30 p.

Results for 53 multiweb beams of various proportions. Graphs, tables, photograph. 5 ref. (Q5, Al)

437-Q. A Further Investigation of the Effect of Surface Finish on Fatigue Properties at Elevated Temperatures. Robert L. Ferguson. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3142, Mar. 1954, 27 p.

Effects of surface roughness on fatigue properties of low-carbon N-155 alloy with grain size ASTM 6 and S-816 alloy with a grain size of ASTM 6 to 7, at 80, 1200, 1350 and 1500° F. Graphs, micrographs, photographs, tables. 10 ref.
(Q7, SG-h)

438-Q. Coefficient of Friction and Damage to Contact Area During the Early Stages of Fretting. II. Steel, Iron, Iron Oxide, and Glass Combinations. John M. Bailey and Douglas Godfrey. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3144, Apr. 1954, 26 p.

Experiments on the start and cause of damage, at frequency of 5 cycles per min., amplitude of 0.006 in., and load of 150 g. in air with relative humidity of less than 10%. Graphs, diagram, tables, micrograph. (Q9, ST, Fe)

439-Q. Study of Antifriction Properties of Chromium Deposits Made Porous by Mechanical Means. D. N. Garkunov and A. A. Poliakov. *Henry Brutcher, Altadena, Calif., Translation no.* 3134, 4 p. (From *Vestnik Mashinostroeniya,* v. 33, no. 6, 1953, p. 65-67.)

Previously abstracted from original. See item 1048-Q, 1953.
(Q9, Cr, CI)

440-Q. (English.) **Cold-Rolled and Primary Recrystallization Textures in Cold-Rolled Single Crystals of Silicon Iron.** C. G. Dunn. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 173-183.

Orientation changes are discussed. Oscillogram, tables, stereograms. 22 ref. (Q24, N5, AY)

441-Q. (English.) **Internal Friction in Titanium and Titanium-Oxygen Alloys.** J. N. Pratt, W. J. Bratina and B. Chalmers. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 203-208.

Low-frequency torsional pendulum technique was used in study of alpha-titanium and titanium-oxygen alpha-solid-solutions containing 4.5 atomic % oxygen. Graphs. 21 ref.
(Q22, Ti)

442-Q. (English.) **Residual Lattice Strains in Iron Single Crystals.** J. H. Auld and G. B. Greenough. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 209-213.

X-ray diffraction measurements of change in interplanar spacing of

iron crystals on plastic extension. The "residual lattice strains" were negligible. Tables, diagrams, radiographs. 6 ref. (Q24, Fe)

443-Q. (English.) **Intergranular Cavitation in Stressed Metals.** J. Neill Greenwood, D. R. Miller and J. W. Suiter. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 250-258.

Cavities appear in intercrystalline boundaries of copper, alpha-brass and magnesium. These are prevalent in boundaries transverse to tensile stress axis. Tables, graphs, micrographs. 15 ref. (Q23, R2, Cu, Mg)

444-Q. (English.) **Creep of Silver Bromide at High Temperature.** R. W. Christy. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 284-295.

Transient and steady-state creep rate of single crystal and polycrystalline specimens stressed in compression from 6 to 150 g/mm. was investigated between 200 and 410° C., with emphasis on steady-state creep of single crystals. Graphs, photograph, table, diagrams. 23 ref. (Q3)

445-Q. (English.) **On the Use of Electrical Resistivity as a Measure of Plastic Deformation in Copper.** R. H. Pry and R. W. Hennig. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 318-321.

Increase in resistivity after room temperature anneal is closely related to stress required to continue deformation. Graphs, diagram. 7 ref. (Q24, P15, Cu)

446-Q. (English.) **Work-Softening in Aluminium Crystals.** R. J. Stokes and A. H. Cottrell. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 341-342.

Tensile specimens of 99.992% aluminum were made into single crystals by strain-anneal method and examined in hard-beam machine at strain rate of 2.5×10^{-5} sec.$^{-1}$ and at temperatures from −185 to +100° C. Diagrams. 2 ref. (Q23, Al)

447-Q. (Dutch.) **Combating Wear and Tear.** H. Blok and G. Salomon. *Metalen,* v. 9; *Handel en Industrie,* v. 9, no. 4, Feb. 28, 1954, p. 26-30.

Maintenance problems of metallic and nonmetallic material wear. Diagram. 7 ref. (Q9)

448-Q. (French.) **Different Forms of the Principle of B. de Saint-Venant.** Walter Schumann. *Comptes rendus,* v. 238, no. 9, Mar. 1, 1954, p. 988-990.

Theoretical study of Saint-Venant's principle with regard to deformation of a prism. 7 ref. (Q24)

449-Q. (French.) **Applications of the Method of Superimposed Lattices to the Study of Various Problems of Elasticity.** Lucien Malavard and Jean Boscher. *Comptes rendus,* v. 238, no. 10, Mar. 8, 1954, p. 1093-1095.

Applications to states of elasticity to planes or surfaces of revolution and to flexure of elastic plates. (Q21)

450-Q. (French.) **Influence of Copper on the Properties of Cast Irons.** *Fonderie,* 1954, Feb., no. 97, p. 3825-3829.

Influence on iron-carbon diagram, graphitization of gray pig, structure and mechanical properties, high-temperature and corrosion resistance and on special cast irons containing nickel, manganese, chromium or molybdenum. Table. 14 ref. (Q general, M27, N8, R general, Cu, CI)

451-Q. (French.) **Contribution to the Study of the Modulus of Elasticity of Metallic Alloys.** René Le Roux. *Métaux, Corrosion-Industries,* v. 29, no. 342, Feb. 1954, p. 66-87.

Modulus of elasticity of copper alloys. Variation as a function of chemical composition. Micrographs, tables, graphs. 15 ref. (Q21, Cu)

452-Q. (French.) **C.E.M.E. Conference, December 18, 1953. Present Results of the Statistical Study of the Mechanical Characteristics of Steels A37 and A42. III. Exploitation of Results for Application to Metallic Construction.** M. Hebrant. *Ossature metallique,* v. 19, no. 3, Mar. 1954, p. 135-141.

Choice of lower limit of elasticity as criterion for calculating admissible stresses; determination of admissible stresses from results of statistical study; and importance of controlling elastic limit and its consequences. Tables, graphs. (Q21, ST)

453-Q. (French.) **New Non-Destructive Process for Determining Residual Stresses of Surfaces.** L. Hausseguy and H. Martinod. *Recherche Aéronautique,* 1954, no. 37, Jan.-Feb., p. 43-50.

Exact determination of "Hertzian hardness" as related to elastic limit. Diagrams, graphs, photograph, tables. 8 ref. (Q25)

454-Q. (French.) **Characteristic Features and Determination of the Concept of Vickers Microhardness.** H. Bückle. *Revue de métallurgie,* v. 51, no. 1, Jan. 1954, p. 1-12.

Comprehensive study of causes of error in microhardness testing. Results show possibility of distinguishing three ranges of Vickers hardness. Table, micrographs, graphs, diagrams. 35 ref. (Q29)

455-Q. (French.) **Effect of Grain Boundaries in Metals and Alloys on Some of Their Mechanical Properties in the Region of Melting Point.** Christian Boulanger. *Revue de métallurgie,* v. 51, no. 3, Mar. 1954, p. 210-218.

Use of Hysteresimeter for studying internal friction and elastic modulus of alloys. Table, graphs, diagram, micrographs. 7 ref. (Q21, Q22, Al)

456-Q. (German.) **On the Calculation of the Strain Energy Associated With the Nucleation of a New Phase Within a Crystal.** E. Kröner. *Acta Metallurgica,* v. 2, no. 2, Mar. 1954, p. 302-309.

Method permits calculation of strain energy provided deformation is caused by difference in volume of phases and is not too large so that approximations of linear theory of elasticity are not valid. Graph. 10 ref. (Q21)

457-Q. (German.) **Development of a Practical Process of Determining the Transverse Elastic Strain of Test Bars With Measuring Springs.** I. W. Kuntze. *Archiv für technisches Messen,* 1954, no. 218, Mar., p. 65-66.

Measuring-spring arrangement, geometry of system, method of computing transverse strain and use of the device. Diagrams. (Q21)

458-Q. (German.) **Journal Bearing Calculations.** H. Sassenfeld and A. Walther. *Forschung auf dem Gebiete des Ingenieurwesens,* v. 20, Ausgabe B, *VDI Forschungsheft,* no. 441, 1954, 28 p.

Physical problem boundary conditions and mathematical treatment by Reynolds' equations. Graphs, tables, diagrams. 27 ref. (Q9)

459-Q. (German.) **Experiments With Friction Bearing Metals.** W. Peppler. *Forschung auf dem Gebiete des Ingenieurwesens,* v. 20, Ausgabe B, no. 1, 1954, p. 32-33.

Arrangement for testing and oscillographically recording bearing properties of lubricated metals. Diagrams, graph, oscillograms. 5 ref. (Q9, Sn, Sb, Cu, Pb)

460-Q. (German.) **Survey of the Field of Wear.** Hans Wahl. *Metalen,* v. 9, no. 4, Feb. 28, 1954, p. 49-58 + 2 plates.

Comprehensive review of wear problems of bearing materials, tools, abrasives, tires, street surfaces, floor covering and clothing. Tables, graphs, photograph, diagrams. (Q9)

461-Q. (German.) **The Relationship Between Hardness and Tensile Tests.** A. Braun. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 20, no. 2, Feb. 1954, p. 56-58.

Elasticity, hardness increase and heterogeneity factors most responsible for load dependence in hardness testing. Graphs, table. 2 ref. (Q29, Q27, Cu, Be)

462-Q. (German.) **Influence of Chemical Composition and Quenching Temperature on Increase of Tensile Strength of Water Hardened Spring Wire From Unkilled Basic Converter Steel.** Robert Grimm and Alfred Krüger. *Stahl und Eisen,* v. 74, no. 6, Mar. 11, 1954, p. 331-338.

Effect of composition, quenching temperature and aging. Tables, graphs, micrographs. 14 ref. (Q23, ST)

463-Q. (German.) **Quality Determination of Cog Defects by Measuring Cog Deformation During Engaging Action and Under Operating Stress.** G. Lehnert. *VDI Zeitschrift des Vereines deutscher Ingenieure,* v. 96, no. 8, Mar. 11, 1954, p. 213-220.

Plotting deformation of a cog as function of its angular position yields deformation curves of cog stress. Method of evaluating production defects and determining quality of gear-drive mechanism. Photographs, diagrams, graphs. (Q25)

464-Q. (German.) **Shrinkage, Shrinkage Stresses, and Their Effect in Metallic Constructions.** H. Sossenheimer. *VDI Zeitschrift des Vereines deutscher Ingenieure,* v. 96, no. 9, Mar. 21, 1954, p. 275-278.

Possibilities of reduction and elimination of shrinkage cracks through plastic straining during welding. (Q25, K general)

465-Q. (German.) **Properties of Metallic Melts. IX. Internal Friction of Liquid Aluminum-Zinc Alloys.** Erich Gebhardt, Manfred Becker and Stefan Dorner. *Zeitschrift für Metallkunde,* v. 45, no. 2, Feb. 1954, p. 83-85.

Melts showed continuous decrease of viscosity with increased temperature. Table, graphs. 13 ref. (Q22, Al, Zn)

466-Q. (Russian.) **Influence of Oxide Films on the Mechanical Properties of Monocrystals of Cadmium.** V. I. Likhtman and V. S. Ostrovskii. *Doklady Akademii Nauk SSSR,* v. 93, no. 1, Nov. 1, 1953, p. 105-107.

Mechanism by which thin oxide films increase creep limits and retard further deformation. Preparation of film and test specimen. Graphs, table. 4 ref. (Q3, Q24, Cd)

467-Q. (Russian.) **Wear of Guides of Rectilinear Motion in Metal Cutting Machines.** V. A. Ambarov. *Vestnik Mashinostroeniia,* v. 33, no. 10, Oct. 1953, p. 26-31.

Experimental investigations. Suggestions to increase life of parts. Diagrams, graphs. 2 ref. (Q9, G17)

468-Q. (Swedish.) **Practical Aspects of Hardness Tests for Strip Steel.** G. Molinder. *Jernkontorets Annaler,* v. 138, no. 2, 1954, p. 81-96.

Advantages of Vicker's method on cross sections. Comparison with Rockwell C. Tables, graphs, diagram. 5 ref. (Q29, ST)

469-Q. **A Statistical Study of the Stress-Rupture Test.** C. W. Phillips and M. J. Sinnot. *American Society for Metals, Transactions,* v. 46, 1954, p. 63-86.

Replicate tests were made on 2S aluminum at 900° F. Variation in fracture time and reduction in area at given stress may be represented by logarithmic-normal distribution

while elongation distribution is normal. Graphs, tables, micrographs. 20 ref. (Q4, Al)

470-Q. A Study of Factors Controlling Strength in the Torsion Test. R. D. Olleman, E. T. Wessel and F. C. Hull. *American Society for Metals, Transactions,* v. 46, 1954, p. 87-99.

Tests were studied over a wide range of tempered hardnesses in a 1.0% carbon, 5.0% chromium, 1.0% molybdenum and 0.2% vanadium toolsteel. Diagram, table, graph, photographs, micrographs. 9 ref. (Q1, TS)

471-Q. Effect of Composition on Transverse Mechanical Properties of Steel. C. Wells, J. V. Russell and S. W. Poole. *American Society for Metals, Transactions,* v. 46, 1954, p. 129-156.

Effects on tensile strength, reduction of area and transverse impact strength of certain normalized, quenched and tempered steels. Tables, graphs. 16 ref. (Q27, Q6, ST)

472-Q. Effect of Copper Additions on the Plastic Properties of an Aluminum-Zinc Alloy. C. D. Starr and J. E. Dorn. *American Society for Metals, Transactions,* v. 46, 1954, p. 348-353.

True stress-true strain curves exhibited increasing flow stresses with increasing atomic percentages of copper. Tables, graphs. 9 ref. (Q23, Al, Zn)

473-Q. Flow and Fracture Characteristics of Annealed Tungsten. J. H. Bechtold and P. G. Shewmon. *American Society for Metals, Transactions,* v. 46, 1954, p. 397-408.

Except for temperature at which brittleness occurs, effect of temperature on tensile properties is similar to effect on other body-centered cubic metals. Diagrams, graphs, table, micrographs. 9 ref. (Q26, Q23, W)

474-Q. Notch Ductility of Nodular Iron. W. S. Pellini, G. Sandoz and H. F. Bishop. *American Society for Metals, Transactions,* v. 46, 1954, p. 418-445.

Impact and explosion tests of castings containing a sharp notch were used to evaluate significance of Charpy data to service and to establish comparisons with cast and rolled steels subjected to same tests. Photographs, table, diagrams, micrographs, graphs. 6 ref. (Q6, ST, CI)

475-Q. High-Temperature Steam Pipes. P. H. Margen. *Engineering,* v. 177, Apr. 9, 1954, p. 457-462.

Properties of main high-temperature pipe steels. Suggested working stresses applied to problems of design. Tables, graphs. 17 ref. (Q25, ST)

476-Q. Notch Ductility. S. Downs. *Iron & Steel,* v. 27, Apr. 1954, p. 139-140, 144.

Advantages gained by considering transition temperature instead of only impact value in test at atmospheric temperature. Graphs, tables. (Q23, Q6, AY)

477-Q. The Ultimate Strength of Aluminum-Alloy Formed Structural Shapes in Compression. Robert A. Needham. *Journal of the Aeronautical Sciences,* v. 21, Apr. 1954, p. 217-229.

Method based on assumption that a formed structural shape consisting of a series of flat plate elements can be treated as series of angle sections possessing various degrees of edge support parallel to direction of loading. Graphs, tables, diagrams. 18 ref. (Q28, Al)

478-Q. Research Progress: The Ductility of Molybdenum. *Metal Industry,* v. 84, Apr. 2, 1954, p. 270.

Problem of securing easy workability after heat treatment. 1 ref. (Q23, Mo)

479-Q. Mechanical Properties of Aluminum Electrical Bus. G. W. Stickley and C. O. Smith. *Power Apparatus and Systems,* 1954, no. 11, Apr., p. 100-106.

Data that will assist designer. Results of tensile, compressive and bend tests. Graphs, tables, photographs. 12 ref. (Q23, Q28, Q5, Al)

480-Q. The Surface Temperature of Sliding Solids. F. P. Bowden and P. H. Thomas. *Royal Society, Proceedings,* v. 223, ser. A, Apr. 7, 1954, p. 29-40 + 1 plate.

Temperature developed at points of rubbing contact between a metal and a transparent solid determined by measuring infra-red radiation transmitted through the solid. It is shown that high, fluctuating temperatures occur and results are in general agreement with those obtained by other physical methods. Graphs, diagram, oscillograms. 10 ref. (Q9)

481-Q. Possible Sources of Error in Hardness Testing. K. Meyer. *Sheet Metal Industries,* v. 31, no. 324, Apr. 1954, p. 289-293; disc., p. 293-299, 341. (Translated from German.)

Some sources of error are scratches, cracks, broken out pieces and matt surface spots. Effects on Brinell and Vickers testers. Micrograph, graph, charts. 5 ref. (Q29)

482-Q. Hardness of Solids. D. Tabor. *South African Mining and Engineering Journal,* v. 65, pt. 1, Mar. 13, 1954, p. 41-43, 45, 47.

Investigations show indentation hardness of metal is related to its plastic yield-stress. Further study shows a simple physical explanation of familiar Mohs scratch-hardness scale for minerals. Graphs, tables, diagram. 14 ref. (Q29)

483-Q. Evaluation of Notch-Bend Specimens. P. P. Puzak and W. S. Pellini. *Welding Journal,* v. 33, Apr. 1954, p. 187S-192S.

Energy transition curve provides significant and practical method of correlation to service pereformance of welded structures based on use of Charpy V-notch specimens. Diagrams, graphs, table. 6 ref. (Q6, K general)

484-Q. Critical Energy Rate Analysis of Fracture Strength. G. R. Irwin and J. A. Kies. *Welding Journal,* v. 33, Apr. 1954, p. 193S-198S.

Mechanical concepts basic to an understanding of fracturing control possibilities and their applicability to large welded structures. Diagram, graph. 8 ref. (Q26)

485-Q. Shearing Resistance of Bolts Partially Embedded in Concrete. D. R. Young and R. A. Hechtman. *Trend in Engineering, (University of Washington),* v. 6, Apr. 1954, p. 16-21.

Ultimate strength of concrete, bolt diameter and length of embedment given the bolt. Graphs, diagrams, photographs, tables. (Q2)

486-Q. Brittle Fracture Studies in the United States. S. L. Hoyt. Paper from "Conference on Brittle Fracture in Steel". West of Scotland Iron and Steel Institute, p. 145-161; disc., p. 326-397.

Investigations in U. S. and their relation to work in rest of world. Basic principles and description of tests. Table, graph. (Q26, CN)

487-Q. The Mechanism of Fracture in Impact Tests. P. Matton-Sjöberg. Paper from "Conference on Brittle Fracture in Steel". West of Scotland Iron and Steel Institute, p. 180-223; disc., p. 326-397.

Standard Charpy keyhole, and Schnadt K_o tests used. Summarizes factors involved in brittle fracture. Graphs, photographs, micrographs, diagrams, tables. (Q6, CN)

488-Q. Notch Ductility of Mild Steel Ship Quality Plates. I. M. MacKenzie. Paper from "Conference on Brittle Fracture in Steel". West of Scotland Iron and Steel Institute, p. 224-258; disc., p. 326-397.

Statistical investigation of plate from two mills. Concludes that notch ductility of thick plate should be improved. Tables, graphs, micrographs. (Q6, Q23, CN)

489-Q. The Propagation of Brittle Fracture. T. S. Robertson and D. le M. Hunt. Paper from "Conference on Brittle Fracture in Steel". West of Scotland Iron and Steel Institute, p. 259-275; disc., p. 326-397.

Tests support concept of constant force for crack propagation. Graphs, diagrams, tables, photograph, micrograph. (Q26, CN)

490-Q. Transverse Strength and Brittle Fracture. W. Soete. Paper from "Conference on Brittle Fracture in Steel". West of Scotland Iron and Steel Institute, p. 276-293; disc., p. 326-397.

Shows how transition temperature can be determined from variation of transverse fracture strength with temperature. Diagrams, photographs, micrographs, graphs. (Q26, Q23, CN)

491-Q. Dimensions in Testing. C. F. Tipper. Paper from "Conference on Brittle Fracture in Steel". West of Scotland Iron and Steel Institute, p. 294-312; disc., p. 326-397.

Size shown to be of little effect except in presence of a notch. Dimensions determine nature of initiation and propagation of a crack. Graphs, table, diagram. (Q6, CN)

492-Q. The Influence of Welding on Notch-Brittle Fracture. A. A. Wells. Paper from "Conference on Brittle Fracture in Steel". West of Scotland Iron and Steel Institute, p. 313-325; disc., p. 326-397.

Initiation and propagation of cracks during and after welding. Remedial measures. Graphs, diagram. (Q6, K general, CN)

493-Q. The Brittle Fracture Problem From a Shipbuilder's Point of View. N. G. Leide. Paper from "Conference on Brittle Fracture in Steel". West of Scotland Iron and Steel Institute, p. 162-179; disc., p. 326-397.

Temperature, rate of deformation, stress state and material properties as causes of brittle fracture. Table, photographs, diagrams, graphs. (Q6, Q26, CN)

494-Q. (English.) **Investigation on the Strength of 24 S-T Alclad Riveted and Bolted Lap Joints at Rapidly Applied Loads.** J. P. Benthem and R. Kruithof. *Netherlands Nationaal Luchtvaartlaboratorium Report* S. 415, July 1953, 5 p. + 12 plates.

Load was applied to specimens from 0.01 to 1.5 sec. Load-versus-time diagrams. Diagrams, graphs, photograph. 5 ref. (Q27, K13, Al)

495-Q. (German.) **Review of the Field of Wear and Tear. II-III.** Hans Wahl. *Metalen,* v. 9, no. 5, Mar. 15, 1954, p. 68-74; no. 6, Mar. 31, p. 91-98.

General and specialized basic research. Methods for investigating wear of metals by minerals. Development and testing of various wear resistant materials. Tables, charts, diagrams, photographs. (To be continued.) (Q9, CI, Ni, Cr, AY, Cu)

496-Q. (German.) **Thermal and Mechanical Behavior of Amorphous Solids as Result of Molecular Transpositions.** W. Holzmüller. *Zeitschrift für physikalische Chemie,* v. 202, nos. 5-6, Jan. 1954, p. 440-459.

Softening of amorphous solids, melting of and thermal effect on tensile strength and plastic flow and thermal conductivity crystals,

glasses, and resins. Graphs. 15 ref. (Q23, Q24, M26)

497-Q. (Russian.) **Influence of Additions of Alkaline Metals on the Surface Tension and Microhardness of Bismuth.** I. P. Altynov. *Doklady Akademii Nauk SSSR,* v. 93, no. 5, Dec. 11, 1953, p. 845-846.

Comparison of graphs shows that the greater the surface activity of the addition the higher will it raise the microhardness. Graphs. 9 ref. (Q27, P10, Bi)

498-Q. (Russian.) **Critical Stress of a Long Cylindrical Shell During Torsion.** N. A. Alumiae. *Prikladnaia Matematika i Mekhanika,* v. 18, no. 1, 1954, p. 27-34.

Integration of an equation of fourth order satisfying two boundary conditions on each contour of mean surface. Graph. 5 ref. (Q1)

499-Q. (Russian.) **Stability of a Spherical Shell Under Evenly Distributed External Pressure.** V. I. Feodos'ev. *Prikladnaia Matematika i Mekhanika,* v. 18, no. 1, 1954, p. 35-42.

Galerkin method used. Graphs. 7 ref. (Q25)

500-Q. (Russian.) **The Concentration of Stress and Calculation of the Strength of a Shaft Having Transverse Openings.** A. S. Leikin. *Vestnik Mashinostroeniia,* v. 34, no. 3, Mar. 1954, p. 3-14.

Stress distribution in bending and torsion tests of hollow aluminum shafts. Significance of size and slope of holes. Diagrams, graphs, table. 12 ref. (Q25, Al)

501-Q. (Russian.) **Calculation of Disks With Consideration of Plastic Deformation.** R. M. Shneiderovich. *Vestnik Mashinostroeniia,* v. 34, no. 3, Mar. 1954, p. 14-20.

Integral equations of plasticity for problem of supporting capacity, stress and deformation of varied-contour steel disks. Graphs. 4 ref. (Q24, ST)

502-Q. (Russian.) **Second Phase Mechanisms During Testing of Austenite Steel Relaxation.** Ia. S. Gintsburg. *Vestnik Mashinostroeniia,* v. 34, no. 3, Mar. 1954, p. 46-49.

Construction of relaxation curves in semilogarithmic coordinates and their extrapolation for long-term testing has great possibilities in evaluating relaxation. Tables, graphs. 2 ref. (Q3, ST)

503-Q. (Russian.) **Strength of Weld Joints of Low-Alloy and Low-Carbon Steels.** M. M. Kraichik and A. I. Krasovskii. *Vestnik Mashinostroeniia,* v. 34, no. 3, Mar. 1954, p. 63-64.

Compares impact, aging, creep, fatigue and tensile strengths of welding steels. Table, graphs. 3 ref. (Q general, AY, CN)

504-Q. Internal or Residual Stresses in Wrought Aluminium Alloys and Their Structural Significance. G. Forrest. *Royal Aeronautical Society, Journal,* v. 58, Apr. 1954, p. 261-276.

Dangers arising from inhomogeneity, directional properties and residual stresses in design and production of structures. Graphs, tables, diagrams. 29 ref. (Q25, Al)

505-Q. The Strength Properties and Frictional Behaviour of Brittle Solids. R. F. King and D. Tabor. *Royal Society, Proceedings,* v. 223, ser. A, Apr. 22, 1954, p. 225-238 + 4 plates.

Application of adhesional theory of friction to rock-salt, glass and lead sulfide. Tables, graphs, photographs, micrographs. 21 ref. (Q23, Q9)

506-Q. (English.) **Torsion of Cross-Braced Pyramidal Transmission Towers.** P. Csonka. *Acta Technica Academiae Scientiarum Hungaricae,* v. 8, nos. 1-2, 1954, p. 25-36.

Mathematical analysis of bar forces and warping. Diagrams, table. 5 ref. (Q1)

507-Q. (German.) **Stability of Beams of Rectangular Cross Section Suspended at Both Ends.** P. Csonka. *Acta Technica Academiae Scientiarum Hungaricae,* v. 8, nos. 1-2, 1954, p. 79-90.

Mathematical analysis of lateral buckling under uniformly distributed loading. Diagrams. 4 ref. (Q28)

508-Q. (German.) **Internal Stresses From Flame Surface Hardening.** Hans Bühler. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 3-4, Mar.-Apr. 1954, p. 153-158.

Study of factors causing internal stresses and influence of stress-relief temperature reveals relationship between flame hardening and water-quench method. Tables, graphs. 28 ref. (Q25, J1, J2, ST)

509-Q. (German.) **Effect on Microhardness Curves Due to Instrument Defects.** Reinhart Schulze. *Metalloberfläche,* Ausgabe A, v. 8, no. 4, Apr. 1954, p. 52-54.

Proves maximum values on Grodzynski's hardness curves result from lateral slippage of Vickers hardness tester. Photograph, graphs. 10 ref. (Q29)

510-Q. (German.) **Theory of Strain Hardening Using Creep in Metals.** Gerhard Lucas and Kurt Lücke. *Zeitschrift für angewandte Physik,* v. 6, no. 2, Feb. 1954, p. 64-70.

"Exhaustion theory" shows exponential distribution of activation energy leads to Andrade's parabolic creep law. Effect of temperature and stress. Graph. 23 ref. (Q3)

511-Q. (Hungarian.) **Mechanical Testing of Nonferrous Metals Castings.** Karoly Maréchal. *Ontöde,* v. 5, no. 3, Mar. 1954, p. 66-67.

Suggests examination based on varying shapes and casting technology of individual pieces rather than on properties of test bars. Photographs. (Q general)

512-Q (Book.) **Conference on Brittle Fracture in Steel.** p. 145-406. 1953. *West of Scotland Iron and Steel Institute,* 39 Elmbank Crescent, Glasgow, Scotland. $6.00.

Consists of eight papers individually abstracted. (Q26, Q23, CN)

513-Q. (Book.) **The Elevated-Temperature Properties of Chromium-Molybdenum Steels.** 212 p. 1953. *American Society for Testing Materials.* Philadelphia 3, Pa. $4.75.

Elevated-temperature data including tensile and yield strengths, percent elongation, reduction in area, and stresses for rupture and creep rates. (Q27, Q3, Q4, AY)

514-Q. (Book.) **Mechanics of Materials.** Philip G. Larson and William J. Cox. 3rd Ed. 414 p. John Wiley and Sons Inc., 440 Fourth Ave., New York 16, N. Y. $5.75.

Fundamental principles underlying machine and structural design. Examines physical behavior of stressed bodies, not merely from viewpoint of its mathematical expression, but also in light of practical problems that confront engineer. (Q general)

515-Q (Book.) **Rigid Frame Formulas.** A. Kleinlogel. 1st Ed. Frederick Ungar Publishing Co., 125 E. 24th St., New York 10, N. Y. $10.00.

Ready-to-use formulas for structural engineers will save many design hours. Elastic theory results may complement plastic design procedure. (Q21, Q23, T26)

516-Q. (Book.) **Steel Construction.** 5th Ed. 432 p. 1953. *American Institute of Steel Construction,* 101 Park Ave., New York 17, N. Y. $3.00 (thumb index) $2.00 (plain).

Book designed to provide maximum convenience for estimator, designer, and detailer, rather than to adhere to strictly academic classification. (Q general, T26, ST)

R Corrosion

203-R. New Techniques and Current Problems in Controlling Underground Corrosion. O. C. Mudd. *American Petroleum Institute, Proceedings,* sec. V. Transportation, v. 33, 1953, p. 35-45.

Includes adaptation of anodic metals for electrical-equipment grounding, isolation of reinforcing steel in concrete and measures which prevent current flow to metal contacts supported by concrete. Diagrams, photographs, graphs, table. (R8)

204-R. Causes of Corrosion in Deep Well Water Pumps in Israel. A Technical Note. D. Spector. *Corrosion,* v. 10, Apr. 1954, p. 122-123.

Galvanic currents caused by temperature differential between upper and lower portions of well liners and pump components; galvanic corrosion from incompatible metals; and current discharge from interconnected piping system. Diagrams, photographs. (R1, R4)

205-R. Economics of Cathodic Protection. Ray M. Wainwright. *Gas,* v. 30, Apr. 1954, p. 48-53.

Basic aspects of correct economic analysis. Includes elementary principles of interest rates, annuities, sinking funds and other types of transactions involving money. Methods of determining costs and of making economic comparisons. Graphs. 3 ref. (R10, A4)

206-R. The Corrosion of Machinery in H.M. Ships. L. Kenworthy. *Journal of Applied Chemistry,* v. 4, Mar. 1954, p. 97-106.

Examples of corrosion problems and remedial measures. Photographs, micrographs. 21 ref. (R general)

207-R. Minimizing Fretting Corrosion. E. M. Johnson. *Machine Design,* v. 26, Apr. 1954, p. 348, 350, 352, 354.

Effects of lubricants, hardness and material and clearance of fits of moving parts as applied to ferrous metals. (R1, Fe)

208-R. Simple Corrosion Theory as an Aid to Materials Selection. I. T. K. Ross. *Petroleum,* v. 17, Apr. 1954, p. 116-118.

Chemical immunity, over-potential and film formation considered as phenomena contributing to corrosion resistance. Graphs, diagrams. (To be continued.) (R1)

209-R. Analysis of the Formation Current in Electrolytic Oxidation of Zirconium. J. J. Polling and A. Charlesby. *Physical Society, Proceedings,* v. 67, no. 411B, Mar. 1, 1954, p. 201-210.

Formation current consists of both ionic and electronic components. Former produces film growth; latter liberates oxygen. Separate measurements of these components. Diagram, tables. 6 ref. (R2, Zr)

210-R. Attack of Scaling-Resistant Materials by Vanadium Pentoxide and Effect of Various Alloying Elements Thereon. E. Fitzer and J. Schwab. *Henry Brutcher, Altadena, Calif., Translation no.* 3132, 15 p. (Slightly condensed from *Berg- und Hüttenmännische Monatshefte,* v. 98, no. 1, 1953, p. 1-7.)

Previously abstracted from original. See item 208-R, 1953.
(R2, Cu, Fe, Ni, SS)

211-R. Corrosion-Resistant Cemented Carbides. J. Hinnüber and O. Rüdiger. *Henry Brutcher, Altadena, Calif., Translation no.* 3135, 9 p. (Part I of "Cemented Carbides With High Resistance to Corrosion and Scaling" from *Archiv für das Eisenhüttenwesen,* v. 24, nos. 5-6, 1953, p. 267-269.)

Previously abstracted from original. See item 308-M, 1953.
(R general, M24, Cr, Ni, Co)

212-R. Testing of Stainless Steels for Intergranular Corrosion. H. J. Rocha. *Henry Brutcher, Altadena, Calif., Translation no.* 3196, 10 p. (From *Stahl und Eisen,* v. 70, no. 14, 1950, p. 608-609.)

Previously abstracted from original. See item 395-R, 1950. (R2, SS)

213-R. Process of Oxidation of Titanium Carbide-Cobalt Compositions. W. Kinna and O. Rüdiger. *Henry Brutcher, Altadena, Calif., Translation no.* 3223, 26 p. (From *Archiv für das Eisenhüttenwesen,* v. 24, nos. 11-12, 1953, p. 535-542.)

Previously abstracted from original. See item 129-R, 1954.
(R2, Ti, Co)

214-R. (German.) **Influencing the Oil-Ash Deposition in Industrial Gas Turbine Plants by Controlling Combustion.** Peter T. Sulzer. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 20, no. 2, Feb. 1954, p. 33-41.

Reduction of wear and corrosion of turbine blades and parts by ash deposits, carbon and chemical compounds. Photographs, graphs, tables, micrographs. 3 ref. (R11, Q9)

215-R. (German.) **The Influence of Condition of the Surface of Iron Upon Rapidity of Corrosion When Buried in Soil.** Tihomil Markovic. *Werkstoffe und Korrosion,* v. 5, no. 3, Mar. 1954, p. 81-83.

Current measurements with rough and smooth iron demonstrated that reversal of current direction, dependent on soil dampness, takes place between narrow limits. Graphs. 6 ref. (R8, Fe)

216-R. (German.) **Cathodic Corrosion Prevention.** Wolfgang Thury. *Werkstoffe und Korrosion,* v. 5, no. 3, Mar. 1954, p. 84-87.

Possibilities and limits of application by use of external current supplies in connection with an auxiliary insoluble anode. Iron and aluminum were subjected to various forms of corrosion. Tables. 16 ref.
(R10, Al, Fe)

217-R. (German.) **Contribution to the Theory of Chemical Polarization During Solution, Separation, and Overvoltage of Metals.** Willi Machu. *Werkstoffe und Korrosion,* v. 5, no. 3, Mar. 1954, p. 87-92.

Surface layers exercise a restraining effect on adjustment of equilibrium of association. Formation continues at high rate and forms an indication of the behavior of metal in solution after preliminary treatment. Tables, graphs. 13 ref.
(R1, Zn)

218-R. Resistance of Cast Fe-Ni-Cr Alloys to Corrosion in Molten Neutral Heat Treating Salts. J. H. Jackson and M. H. LaChance. *American Society for Metals, Transactions,* v. 46, 1954, p. 157-183.

Resistance of 65 alloys to corrosion in five commercial heat treating salt baths. Tables, graphs, diagram. (R5, J2, ST)

219-R. Physical Chemistry of Metal Oxidation. Leo F. Epstein. *Ceramic Age,* v. 63, Apr. 1954, p. 37-40.

Thermodynamic and kinetic factors of importance in analyzing behavior of metal-ceramic seals, or more precisely, metal-oxide combinations. Table. 19 ref. (R2, K11)

220-R. Corrosion Problems of Ammonium Sulphate Manufacture. A. W. Bamforth. *Chemical & Process Engineering,* v. 35; *Corrosion Technology,* v. 1, Apr. 1954, p. 31-35.

Materials of construction covered include stainless steels, nickel alloys, rubber-lined mild steel, lead, silicon irons, aluminum and a number of plastics. Photographs, tables, diagrams. 50 ref. (R6)

221-R. Sheet Metal Corrosion. *Chemical & Process Engineering,* v. 35; *Corrosion Technology,* v. 1, Apr. 1954, p. 38.

Results of two-year exposure tests. Photographs. (R3)

222-R. Corrosion for Chemical Engineers. Corrosion and Design. II. L. L. Shreir. *Chemical & Process Engineering,* v. 35; *Corrosion Technology,* v. 1, Apr. 1954, p. 39-42.

Design can afford protection against immersed corrosion and corrosion during finishing process. Diagrams, photograph, table. 24 ref.
(R general, T29)

223-R. High Alloy Castings and Their Applications. I. *Industrial Heating,* v. 21, Apr. 1954, p. 694 + 4 pages.

Importance of high alloy castings in high-temperature and corrosion applications. Test results under various conditions. Photographs. (To be continued.)
(R general, T general, CI)

224-R. Corrosion Problem Solved. Edward Trela. *Modern Metals,* v. 10, Apr. 1954, p. 72, 74, 76.

Aluminum alloy CS72A (No. 12 alloy) found less suitable than alloy S5A for duct boxes for the building trade. Corrosion precautions for exposure to moist cement. Tables, diagram, photograph. (R5, T26, Al)

225-R. Controlling Corrosion in Light Metals Finishing Plants. Robert R. Pierce. *Modern Metals,* v. 10, Apr. 1954, p. 78-80.

Protection of machinery, equipment and buildings from corrosive agents used in plants. Photographs.
(R general, L general)

226-R. Cathodic Protection of the Interior of Cargo Compartments in Oil Tankers. John Lamb, E. V. Mathias and W. Godfrey Waite. *North East Coast Institution of Engineers & Shipbuilders, Transactions,* v. 70, Mar.-Apr. 1954, p. 377-393.

Galvanic method using magnesium-alloy anodes proved practicable. Results over 12 month period. Tables. (R10)

227-R. Status of Digester Corrosion in the South. R. W. Mizell and C. W. Smith. *Paper Mill News,* v. 77, Apr. 24, 1954, p. 12-13, 16.

Review of literature. 12 ref. (R7)

228-R. Corrosion in Sweetening Units. *Petroleum Refiner,* v. 33, Apr. 1954, p. 135-137.

Economic aspects of corrosion associated with two solid bed treaters. Diagram, table. (R7, ST)

229-R. Effect of Low-Temperature Stress-Relieving on Stress-Corrosion Cracking. C. R. McKinsey. *Welding Journal,* v. 33, Apr. 1954, p. 161S-166S.

Controlled low-temperature stress-relieving effective in protecting welded plates from stress-corrosion cracking. Table, photographs, micrographs. 11 ref. (R1, J1, ST)

230-R. (French.) **The Corrosion of Tin by Acetic Acid Dissolved in Organic Liquids.** René Dubrisay and Francois Arlet. *Bulletin de la société chimique de France,* 1954, no. 3, Mar., p. 314-315.

Experimental results. Characteristics of products of corrosion which vary greatly with nature of the liquid solvent. Micrograph. 13 ref.
(R6, Sn)

231-R. (Italian.) **The Behavior of Titanium in Presence of a Gas at High Temperatures.** P. Spinedi. *Alluminio,* v. 23, no. 1, Jan. 1954, p. 35-39.

Oxidation at increasing temperatures in oxygen, carbon dioxide and nitrogen atmospheres. Graphs, tables. 11 ref. (R2, Ti)

232-R. (Norwegian.) **Corrosion of Steel Rods.** Ivan Th. Rosenqvist. *Teknisk Ukeblad,* v. 101, no. 12, Mar. 25, 1954, p. 237-243.

Methods for protecting steel. Proposes protection of parts by cathodic means. Photographs, table. 6 ref. (R10, ST)

233-R. Potentials of Iron, 18-8, and Titanium in Passivating Solutions. Herbert H. Uhlig and Arthur Geary. *Electrochemical Society, Journal,* v. 101, May 1954, p. 215-224.

Data for stainless steel and titanium in other passivating electrolytes. Graph, tables. 47 ref.
(R10, Fe, Ti, SS)

234-R. Comparative Analysis of Digester Corrosion Measurements. TAPPI Digester Corrosion Subcommittee Summary Report No. 1. Nicholas Shoumatoff and H. O. Teeple. *Tappi,* v. 37, Apr. 1954, p. 166-171.

Industry-wide study of corrosion in alkaline digesters by numerical analysis of over 37,000 wall thickness measurements in 89 digesters in 12 different mills. Tables, graph. 12 ref. (R11, R7, ST)

235-R. (Russian.) **Oxidation of Iron in Water Vapor, Vapor-Hydrogen and Vapor-Oxygen Mixtures at High Temperatures.** V. I. Tikhomirov, V. V. Ipatsev and I. A. Gofman. *Doklady Akademii Nauk SSSR,* v. 95, no. 2, Mar. 11, 1954, p. 305-308.

Theoretical investigation closely corresponds to experimental results. Tables, graphs. (R2, Fe)

236-R. (Russian.) **Inhibitors of Atmospheric Corrosion.** S. A. Balezin and V. P. Barannik. *Doklady Akademii Nauk SSSR,* v. 95, no. 2, Mar. 11, 1954, p. 345-347.

Carbonates and benzoates showed good inhibition properties on carbon steel. Table, micrographs. 4 ref.
(R10, R3, CN)

S
Inspection and Control

186-S. Optical Comparison. *Aircraft Production,* v. 16, Apr. 1954, p. 124-127.

New prototype machine for the visual inspection of airframe parts. Photographs, diagrams. (S14)

187-S. How Optics Replace Costly, Time-Consuming Inspection. John P. Wright. *American Machinist,* v. 98, Apr. 12, 1954, p. 168-169.

Optical method of measuring alignment errors in micrometers. Photograph, diagrams. (S14)

188-S. Specifying Accuracy of Form for Machine Parts. Allan H. Candee. *Machine Design,* v. 26, Apr. 1954, p. 139-141.

Tolerances on form are deviations from zero in relation to some imaginary reference. Unless such tolerances can be interpreted in a way that applies to practical methods of measurement, there will be disagreement and confusion. Diagrams.
(S14)

189-S. Ford Benefits by Tool Standardization. Charles H. Wick. *Machinery,* v. 60, Apr. 1954, p. 162-169.

Extensive program encompassing

every phase of tooling and process for manufacture has reached the stage where its many benefits are becoming impressive. Photographs, diagrams. (S22, G general, TS)

190-S. Ultrasonic Testing a Versatile New Inspection Method. Charles H. Wick. *Machinery,* v. 60, Apr. 1954, p. 184-191.

Application to inspection and measurement problems is growing. Instantaneous indications and accurate location of internal defects are obtained economically. Photographs. (S13)

191-S. Metallurgist Assesses Impact of New Automatic Control Mechanisms. Arthur H. Allen. *Metal Progress,* v. 65, Mar. 1954, p. 65 + 8 pages.

Rapid progress in automation deterred by high cost of control mechanisms and in-born suspicion or lack of understanding of their functioning by management and production planners unfamiliar with new techniques. Photographs. 39 ref. (S18, A5)

192-S. Detecting Troubles. (Digest of "How to Detect the Type of an Assignable Cause", Paul S. Olmstead; *Industrial Quality Control,* v. 9, Nov. 1952, p. 32-36, and *Bell Telephone System,* Monograph 2106, Sept. 1953.) *Metal Progress,* v. 65, Apr. 1954, p. 178, 180, 182, 184.

To detect an assignable cause there are five general classifications of statistical tests—control charts, extreme differences, runs, non-parametric association and analysis of variance. (S12)

193-S. New Hot Radiography Process Cuts Pipe-Weld Inspection Time by 50%. Alexander Gobus. *Power,* v. 98, Apr. 1954, p. 126-127.

Controlled cooling of weld before taking a radiograph is not needed. Postheating to relieve internal stresses is unnecessary. Photographs, diagram. (S13, K general)

194-S. Copper Penetration of Car Journals. *Railway Locomotives and Cars,* v. 128, Apr. 1954, p. 58-61.

Copper penetration between grain boundaries produces failure in journal bearings. Micrographs, table. (S21, Cu)

195-S. (French.) **Technical Progress and Economic Aspects of Gamma-Ray Radiography.** C. G. Carlström. *Fonderie,* 1954, Feb., no. 97, p. 3791-3802.

Outlines Swedish research in 1950-52. Sources of radiation, particularly Tm^{170}, diffused radiation, sensitivity and favorable economic aspects. Graphs, tables, diagrams, radiographs. 12 ref. (S13)

196-S. (French.) **Determination of Best Conditions for Examining Cast Iron by Gamma-Ray Radiography by Means of Cobalt 60.** Albert Blondel and Pierre Broquet. *Fonderie,* 1954, Feb., no. 97, p. 3803-3818; disc., p. 3818-3819.

Possible use for nondestructive testing in the foundry. Power of detection, techniques and experimental results. Radiographs, tables, diagrams, graphs. 12 ref. (S13, E general, CI)

197-S. (French.) **A-S10 G and A-S9 KG Preparation Standard.** Jean Montupet. *Fonderie,* 1954, Feb., no. 97, p. 3820-3824.

French specifications for composition and properties of two aluminum casting alloys. Production methods outlined. Table, micrographs. (S22, Al)

198-S. (French.) **Special Shapes in Aluminum Alloys Obtained by Extrusion and Their Application. III.** Pierre Pétrequin and Michel Costeraste. *Revue de l'Aluminium,* v. 31, no. 207, Feb. 1954, p. 75-83.

Normal tolerances on angle radius, contour, angular opening, smoothness, surface coarseness and finishing. Diagrams, tables, photographs. (S22, G5, Al)

199-S. (French.) **Interferrometric Method Using Superposition Fringes.** Michel Cagnet. *Revue d'Optique,* v. 33, no. 1, Jan. 1954, p. 1-25.

Theoretical and experimental study of properties and influence on sharpness and contrast. Diagrams, graphs, photographs, tables. (To be continued.) (S14)

200-S. (German.) **New Processes of Measuring Temperature for the Iron Industry. II. Measuring Temperature With Radiation Pyrometers.** Fritz Lieneweg. *Archiv für technisches Messen,* 1954, no. 218, Mar., p. 51-54.

Temperature measurement of bath, openhearth furnace roof and ingots. Use of color pyrometer for analyzing molten steel and predetermining its properties. Diagrams, graphs. (S16, D general, ST)

201-S. (German.) **The Ultrasound-Impulse Reflection Process of Non-Destructive Materials Testing. I. The Testing Device.** A. Lutsch. *Archiv für technisches Messen,* 1954, no. 218 Mar., p. 67-70.

Circuits and design of a Reflectoscope. Photographs, diagrams, tables. 13 ref. (S13)

202-S. (German.) **Extended Application of Non-Destructive Testing of Welds.** Otto Vaupel. *Schweissen und Schneiden,* v. 6, no. 3, Mar. 1954, p. 108-113; disc., p. 113-115.

Use of radioactive materials, combination of ultrasonic frequencies with X and gamma-rays and fluorescent magnetic powder. Table, diagrams. (S13)

203-S. (German.) **Measuring Temperature With Fluorescent Materials.** P. Brauer. *VDI Zeitschrift des Vereines deutscher Ingenieure,* v. 96, no. 9, Mar. 21, 1954, p. 285-287.

Coatings of various fluorescent materials with different critical temperatures permit measurement. Graphs, photographs. 5 ref. (S16)

204-S. Determination of Oxygen in Titanium and Zirconium by the Isotopic Method. A. D. Kirshenbaum, R. A. Mossman and A. V. Grosse. *American Society for Metals, Transactions,* v. 46, 1954, p. 525-533; disc., p. 533-539.

Using O^{18} as a tracer does not require quantitative separation or recovery of oxygen, thus giving accurate results. Accurate oxygen values were obtained by this method in range of 0.2 to 26%. Diagram, tables. 14 ref. (S11, Zr, Ti)

205-S. TV. Can It Help the Steel Industry. *British Steelmaker,* v. 20, Apr. 1954, p. 126-128.

How equipment works and costs of operation, along with actual installations now in service. Photographs. (S18)

206-S. Design for an Embedded Thermocouple. D. E. Upton. *Engineering,* v. 177, Apr. 16, 1954, p. 489.

Possibilities of mineral-insulated base-metal thermocouple wire contained in a metal sheath. Units are steam tight. Diagrams. (S16)

207-S. Simple Methods of Identifying Common Metals and Alloys. G. DeVries. *Industrial Heating,* v. 21, Apr. 1954, p. 670, 672, 674, 676.

Fifteen simple tests to determine approximate composition. Tables. (S10)

208-S. Standards for Aluminium Casting Alloys. F. H. Smith. *Light Metals,* v. 17, Apr. 1954, p. 114-116.

Compares British with other specifications. (S22, Al)

209-S. Current Light Alloy Specifications. *Light Metals,* v. 17, Apr. 1954, p. 119-127.

Index to British specifications. Tables. (S22, EG-a)

210-S. Open Hearth Bath Temperature Measurement. J. H. Richards. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 96-98; disc., p. 107-109.

Use of immersion thermocouples in three openhearth shops, including installation and maintenance. (S16, D2)

211-S. Thermocouple Bath-Temperature Measurement, Bethlehem Steel. T. B. Winkler. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 98-102; disc., p. 107-109.

Design and maintenance, degree of control and effects on steel quality as experienced at Bethlehem's Lackawanna plant. Diagram, graphs. (S16, D2)

212-S. Thermocouple Bath-Temperature Measurement, Steel Company of Canada. J. P. Orton. *National Open Hearth Committee of the Iron and Steel Div. of the A.I.M.E., Proceedings,* v. 36, 1953, p. 103-107; disc., p. 107-109.

Tapping temperature control by direct immersion instruments and a spoon thermocouple method for control and study of refining periods. Table, graph. (S16, D2)

213-S. Optical Pyrometers, Their Functioning and Maintenance. H. E. Trout, Jr. *Steel Processing,* v. 40, Apr. 1954, p. 237-241, 254.

Pyrometers designed for mill service may be maintained and checked for accuracy in the mill. With reasonable care they will give consistent, reliable results. Photographs, diagrams. (S16)

214-S. A Statistical Approach to Production and Design Problems. A. G. Thompson. *Welding and Metal Fabrication,* v. 22, Apr. 1954, p. 131-138.

Heavy metal fabrication. Two methods based on establishing relationships between time and as few process variables as will yield desired degree of accuracy. Tables, graphs, diagrams. (S12, K general)

215-S. (Italian.) **Determination of Thickness of Anodic Coatings by Gravimetric Method.** A. Prati. *Alluminio,* v. 23, no. 1, Jan. 1954, p. 7-22.

Control by statistical analysis of a series of determinations. Tables, graphs. 4 ref. (S14, L19)

216-S. Surface Waves at Ultrasonic Frequencies. E. G. Cook and H. E. VanValkenburg. *ASTM Bulletin,* 1954, no. 198, p. 81-84.

Theory of mechanical wave propagation along surface of an extended solid medium adapting it to nondestructive materials testing. Graphs, diagram, tables, oscillogram. 12 ref. (S13)

217-S. Electronic Units Make Fast Check on Part Quality. D. Eldred. *Iron Age,* v. 173, Apr. 29, 1954, p.89-91.

Comparative checks on chemical composition, hardness, case depth and plating thickness quickly made with portable electronic units. Instruments and techniques described. Photographs. (S11, S14, Q29)

218-S. (German.) **Research on Test Specimens With Known Defects for Determining Operating Conditions of Ultrasonic Testing.** Erich Theis and Klaus Barteld. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 3-4, Mar.-Apr. 1954, p. 159-164; disc., p. 164.

Effects of impulse time, receiver sensitivity, contact and rear-wall surface conditions, position of defect in relation to sound beam and support of quartz on the ratio of

defect echo to rear-wall echo indicate possibility of estimating size of defect. Diagrams, graphs. (S13)

219-S. (German.) **Surface Measurements by Interference Method.** Ernst Zehender. *Metalloberfläche,* Ausgabe A, v. 8, no. 4, Apr. 1954, p. 49-52.

Replica-film interference process measures depth of roughness of various grinds. Results compared to Leitz-Foster surface tester. Photograph, micrographs, table, diagrams. 8 ref. (S15)

220-S. (German.) **Shop Measurements of Layer Thicknesses in Metal Spraying Practice.** Hans Reininger. *Metalloberfläche,* Ausgabe A, v. 8, no. 4, Apr. 1954, p. 55-61.

Importance of thickness measuring and different magnetic meters. Photographs, tables, graphs. 12 ref. (S14, L23)

221-S. (Book.) **1953 Supplement, Book of ASTM Standards, Pt. II. Non-Ferrous Metals.** 278 p. *American Society for Testing Materials.* 1916 Race St., Philadelphia 3, Pa.

Contains extensively revised standards and tentatives which have been accepted by ASTM since publication of the 1952 Book of ASTM Standards. (S22, EG-a)

T

Applications of Metals in Equipment

136-T. Mold Irons and the Glass Mold Situation. E. R. Flatter. *American Ceramic Society, Bulletin,* v. 33, Apr. 1954, p. 101-103.

No one type of mold iron meets requirements for all applications. Recent development of nodular type graphite iron gives indications of solving more critical glass mold problems. (T29, CI)

137-T. A Tungsten Resistance Thermometer. F. R. Sias, J. R. MacIntyre and A. Hansen, Jr. *Communication and Electronics,* 1954, Mar., p. 66-69.

Performance of successful tungsten resistance thermometer calibrated and adjusted by a unique method. Graphs, diagrams, photograph. 2 ref. (T8, S16, W)

138-T. Aluminium-Alloy Headless Rivets Lower Up-Setting Loads Required. D. A. Barlow. *Engineering,* v. 177, Mar. 26, 1954, p. 398-399.

Tests on driving behavior, shear strength and tensile strength. Photographs, tables. 5 ref. (T7, Q23, Al)

139-T. How Engineers Select Metals for Oil-Film Bearing Applications. E. B. Etchells. *General Motors Engineering Journal,* v. 1, Mar.-Apr. 1954, p. 20-25.

Requirements a bearing metal must meet and properties of the available metals. Tables, diagrams, photographs. 8 ref. (T7, SG-c)

140-T. New Alloy Widens Future for Aluminum in Pressure Vessels. John B. Campbell. *Materials & Methods,* v. 39, Apr. 1954, p. 97-101.

Higher design stresses make aluminum more competitive with other materials where corrosion resistance or lack of product contamination are important. Photographs, tables, graphs. (T26, Al)

141-T. Where and How Thermostat Metals are Used. Malcolm W. Riley. *Materials & Methods,* v. 39, Apr. 1954, p. 102-105.

Materials and principles involved in intelligent selection of thermostatic controls. Drawings, tables. (T8, SG-a)

142-T. Role of Beryllium in the Atomic Energy Program. Robert E. Pahler. *Metal Progress,* v. 65, Apr. 1954, p. 86-91.

Condensed from paper presented at Beryllium Symposium ASM Meeting, Boston, Mar. 1954. Beryllium, of special interest for use in nuclear reactors, can serve as a moderator and reflector. Photographs, diagrams, table. 1 ref. (T25, Be)

143-T. Lodestones and Magnets. John Parina, Jr. *Metal Progress,* v. 65, Apr. 1954, p. 99-100.

Principle of production of permanent magnets is to obtain by alloying and heat treatment a finely divided precipitate throughout matrix which "keys" oriented structure, and furnishes great resistance to change in magnetic condition. (T8, P16, Fe, Ni, Co, SG-n)

144-T. Three Ways to Use PMM Processes. W. A. Broadley. *Precision Metal Working,* v. 12, Apr. 1954, p. 44-45, 124.

To build smaller and lighter generator, investment castings, die castings and sinterings are used. Photographs. (T25, E13, E15, H general)

145-T. King-Size Cushioners. *Steelways,* v. 10, Apr. 1954, p. 16-17.

Chart on how hot-wound and leaf springs are made. Drawings, photograph. (T7)

146-T. Mower Power to You. Ron T. Smith. *Steelways,* v. 10, Apr. 1954, p. 18-19.

Constant search for better steels yields power mower that cuts nails. Photographs. (T10, ST)

147-T. (French.) **Roofs With Self-Supporting Troughs.** *Revue de l'Aluminium,* v. 31, no. 207, Feb. 1954, p. 61-66.

Combination of materials, manufacturing process and technique of use makes self-supporting aluminum troughs an efficient solution to roofing problems. Photographs, diagrams. (T26, Al)

148-T. (German.) **The Design of Heavy Duty Aluminum Bus Bars for Electrolytic Plants.** K. Kaizik. *Aluminium,* v. 30, no. 3, Mar. 1954, p. 98-100.

Possibility of replacing copper bars by aluminum with welded copper contacts. Graph, diagrams. 2 ref. (T29, Cu, Al)

149-T. (German.) **Aluminum in High Frequency Equipment.** F. Martin. *Aluminium,* v. 30, no. 3, Mar. 1954, p. 101-106.

Physical properties and application in transmitting and receiving equipment. Photographs, tables, graphs. 9 ref. (T1, P15, Al)

150-T. (German.) **The Use of Anti-Friction Bearings in Ironworks From Maintenance Point of View.** Hans Ponnath. *Stahl und Eisen,* v. 74, no. 7, Mar. 25, 1954, p. 396-402.

Types of bearings and proper selection. Damage features as key to cause of failure. Photographs, diagrams, table. 4 ref. (T7)

151-T. Rock-Drilling With Hard Metals. E. J. Sandford and J. R. Wiles. *Alloy Metals Review,* v. 8, Mar. 1954, p. 2-7.

Developments in properties of hard metals and problems involved in use of carbide tipped rock drills including carbide tip, steel stem and joint between them. Photograph, graphs, micrographs. 3 ref. (T23, EG-d)

152-T. Production and Use of Cast-Iron Pressure Pipe. BDSA Study. *American Water Works Association, Journal,* v. 46, Apr. 1954, p. 377-382.

Using past years as guide, with benefit of several predictions by economic groups and experts for 1954 and later years, it is possible to project a pattern for 1954 and 1955. Graphs. (T4, CI)

153-T. Electric Glass Furnace Uses Moly Electrodes. *Chemical Engineering,* v. 61, May 1954, p. 136, 138.

Melting glass by passing electric current through it has proved economical. Remodeled furnace boasts greater flexibility, longer life expectancy. (T29, Mo)

154-T. Castings Play Vital Role in Antibiotics. E. A. Schoefer. *Chemical Engineering,* v. 61, May 1954, p. 244, 246.

High-alloy castings in production of terramycin, chloromycetin and penicillin safeguard product purity while standing up to high temperatures and pressures. Photographs, table. (T29, CI)

155-T. High Alloy Castings in New Equipment Help Steel Industry Expansion. *Industrial Gas,* v. 32, Apr. 1954, p. 3-5, 22-24.

New trends in soaking pits and reheating furnaces, furnace dampers, skid rails, sheet and bar annealing, wire mill applications and metallic recuperators. Photographs, table. (T5, AY, CI)

156-T. High Alloy Castings Reduce Steel Plant Maintenance. *Iron and Steel Engineer,* v. 31, Apr. 1954, p. 132, 134, 137-138.

Individual applications illustrate in detail how cast high alloys meet new demands of steel industry. Photographs, table. (T5, CI)

157-T. Metallurgy in the Mechanical Spring Industry. III. Alloy Steel Wires. *Mainspring,* v. 15, Apr. 1954, 4 p.

Materials, processing techniques and desirable characteristics. Photograph. (T7, G general, AY)

158-T. Aluminum in the Dairy Industry. David Stussi. *Modern Metals,* v. 10, Apr. 1954, p. 34-36.

European dairies make wholesale use of aluminum for all equipment. Reviews trend. Photographs. (T3, Al)

159-T. Tellurium Alloy Lead Sheath for Power Cable. G. B. Shanklin and J. F. Eckel. *Power Apparatus and Systems,* 1954, no. 11, Apr., p. 294-300; disc., p. 300-304.

Tests on new alloy show more stabilized bending and creep properties than on existing cables. Allows wide latitude in heat treatment. Tables, graphs, photograph. 9 ref. (T1, Q3, Q5, Pb, Te)

160-T. Tool and Die Materials Forum. *Steel,* v. 134, Apr. 19, 1954, p. 140-146, 148.

Cost-conscious users are imposing new requirements. Stresses chemical and physical properties once considered insignificant, notable gains being made in higher-alloy, high-physical property steels and economy picture rounded out by new plastics for tools, dies, jigs, fixtures, gages, patterns and locating blocks. (T5, G17, TS)

161-T. Shaped Wire. A Problem Solver. Ray Warner. *Water & Sewage Works,* v. 101, Apr. 1954, p. 170-171.

Application to water and sewage equipment. Photographs. (T4, SS)

162-T. Production of an All-Aluminium Motor-Car Body. C. E. Slade. *Welding and Metal Fabrication,* v. 22, Apr. 1954, p. 124-130.

Advantages of high power to weight and strength-to-weight ratios, high resistance to corrosion and weathering and ease of handling in production. Various welding methods. Photographs. (T21, K general, Al, Mg)

163-T. Applications of Alloy High-Strength Steels in Welded Structures. Howard L. Miller and Arthur E. Wilkoff. *Welding Journal,* v. 33, Apr. 1954, p. 339-350.

Steel having a minimum yield point of 70,000 psi. was successfully

used in design and fabrication of widely different types of equipment found in ordnance, transportation and mining fields. Photographs, diagrams, tables.

(T general, K general, AY)

164-T. Magnesium Ramp. *Welding Journal,* v. 33, Apr. 1954, p. 380.

Portable magnesium ramp facilitates loading and unloading of highway trailers from flat cars. Photograph. (T26, Mg)

165-T. Evaluation of Superheater Materials for High-Temperature Steam. Bela Ronay and W. E. Clautice. *Welding Journal,* v. 33, Apr. 1954, p. 199S-206S.

Experimental installation evaluates superheater materials in contact with steam at temperatures beween 1100 and 1500° F. Diagrams, tables, photographs, micrographs. (T25, SG-h)

166-T. (English.) **Steel Carcasses for Pneumatic Tyres.** *Aciers Fins & Spéciaux Francais,* 1954, no. 16, Feb., p. 58-61.

Development, requirements and advantages. Photographs. (T21, ST)

167-T. (German and French.) **Copper Roofs.** F. Schinacher. *Pro-Metal,* v. 6, no. 37, Feb. 1954, p. 296-303.

Use of copper for eaves, spouts, roofs and trimming and replacing or repairing of deteriorated materials with copper sheet. Photographs. (T26, Cu)

168-T. (Russian.) **Molybdenum-Less Steel for Cold-Forging and Tool Dies.** D. I. Kostenko. *Vestnik Mashinostroeniia,* v. 34, no. 3, Mar. 1954, p. 40-45.

Compares hardness, heat resistance and deformation of molybdenum and titanium steels. Results indicate molybdenum can be replaced with titanium in cold stamping and threading dies. Tables, graphs. (T5, Q general, TS)

169-T Basic Features of Good Piston Design. Frank Jardine. *Automotive Industries,* v. 110, May 1, 1954, p. 54-56, 106.

Data should aid engineers in future design. Graph, diagrams. (T21, Al)

170-T Steel Wire Ropes—Their Construction and Application. F. J. Hewitt. *Institution of Engineers & Shipbuilders in Scotland, Transactions,* v. 97, pt. 6, 1953-54, p. 471-482; disc., p. 483-488.

Quality of wire used in rope making, construction and fabrication of ropes, lubrication and corrosion resistance in relation to service applications. Diagrams. (T7, CN)

171-T. (Book.) **Soft Magnetic Materials for Telecommunications.** C. E. Richards and A. C. Lynch, editors. 346 p. 1953. Pergamon Press Ltd., 242 Marylebone Road, London, N. W. 1, England. $9.00.

Consists of 35 papers from symposium held at the Post Office Engineering Research Station, Apr. 1952. Papers are individually abstracted. (T1, P16, SG-p)

172-T. (Book.) **Steel Pipes for Water, Gas, Sewage and Air.** Stewarts and Lloyds, Ltd., Brook House, Upper Brook St., London, W. 1, England. (No charge.)

Tables of dimensions, tolerances for all classes of steel pipes; special fittings suitable for conveyance of gases; fluids and solids in varying degrees of suspension. Also monographs on strength of steel pipes and on flow of liquids and gases along them. (T27, Q23, ST)

V

Materials

General Coverage of Specific Materials

137-V. Tantalum and Columbium. Joseph W. Rose. *American Machinist,* v. 98, Apr. 12, 1954, p. 189-198.

With certain limitations these refractory metals can be formed, machined and welded on conventional equipment. Photographs, table, diagrams. (Ta, Cb)

138-V. Zirconium. *American Machinist,* v. 98, Apr. 12, 1954, p. 199-202.

Current shop practice and some working problems encountered. Tables. (Zr)

139-V. Republic Team Digs up Titanium Data. Irving Stone. *Aviation Week,* v. 60, Apr. 12, 1954, p. 30 + 6 pages.

Data on forming and working in general. Properties of structures after fabrication. Photographs. (F general, G general, Ti)

140-V. New Weldable Titanium Alloy. G. E. Hutchinson, D. W. Kaufmann and R. C. Durstein. *Materials & Methods,* v. 39, Apr. 1954, p. 91-93.

Composition, properties, forming, fabricating and availability. Graphs, tables, photographs. (Ti)

141-V. Sources, Supplies and Uses of Beryllium. Robert F. Griffith. *Metal Progress,* v. 65, Apr. 1954, p. 81-85.

Condensed from paper presented at Beryllium Symposium ASM Meeting, Boston, Mar. 1954. Difficulties in recovery of beryllium, development of beryllium copper and commercial markets. Photograph, table. (Be)

142-V. Alpha-Molybdenum Hot-Work Die Steels. R. B. Corbett, J. A. Succop and A. Feduska. *American Society for Metals, Transactions,* v. 46, 1954, p. 1599-1618; disc., p. 1618.

Properties of several steels investigated for possible application as hot work die blocks involved determinations of isothermal transformation characteristics and microstructures. Table, graphs, micrographs, diagram. 10 ref. (T5, TS)

143-V. Aluminum Alloy Reference Sheet. Harry W. Fritts. *Chemical Engineering Progress,* v. 50, Mar. 1954, p. 164.

Composition, mechanical and physical properties, formability, heat treatment, weldability and corrosion resistance. (Al)

144-V. Some Properties and Applications of Indium. *Machinery (London),* v. 84, Apr. 9, 1954, p. 751-752.

Physical properties, principal applications and future possibilities. (In)

145-V. Titanium Requirements of the Airframe Industry. Harold Mosier. *Modern Metals,* v. 10, Apr. 1954, p. 40-42.

Survey of present and future needs in terms of alloys, properties, fabricated forms, dimensions and quantities. Chart. (T24, Ti)

146-V. Titanium-Silicon Alloys. D. A. Sutcliffe. *Metal Treatment and Drop Forging,* v. 21, Apr. 1954, p. 191-197.

Binary titanium alloys containing up to 5.5% silicon by weight were prepared by arc melting. Influence of silicon on various physical properties and solid solubility limits. Tables, photograph, diagram, graphs, micrographs. 10 ref. (C21, P general, Ti)

147-V. (German.) **Production of Germanium.** W. Schreiter. *Chemische Technik,* v. 6, no. 3, Mar. 1954, p. 141-148.

Discovery, natural resources, properties, extraction from ores, flydust and coal and uses in electronic equipment. Tables, photographs. 29 ref. (T1, Ge)

148-V. (Hungarian.) **Drop-Forged Steels. I. The Role of Alloying Metals in Drop-Forged Steels.** Erno Weigl. *Kohaszati Lapok,* v. 9, no. 3, Mar. 10, 1954, p. 122-129.

Role of nickel, manganese, chromium, tungsten and molybdenum. Types of steel, composition, heat treatment and applications. Graphs, table. (F22, Ni, Mn, Cr, W, Mo)

149-V. (Book.) **Comprehensive Inorganic Chemistry.** M. Cannon Sneed, J. Lewis Maynard and Robert C. Brasted. v. II. Copper, Silver, and Gold. J. W. Laist. 248 p. 1954. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3, N. Y. $5.00.

Covers minerals and ores, concentration, recovery, commercial metals and alloys, chemical properties, and most common compounds of copper, silver, and gold. (Cu, Ag, Au)

150-V. (Book.) **Copper.** Allison Butts, editor. 832 p. Reinhold Publishing Corp., 330 W. 42nd St., New York 36. $20.00.

Recovery, making and use of copper, fundamental principles and industry practice. Includes chemistry and metallurgy of alloys and compounds. (Cu)

151-V. (Book.) **Titanium and Its Compounds.** Gordon Skinner, H. L. Johnston and Charles Beckett. 174 p. 1954. Herrick L. Johnston Enterprises, 540 W. Poplar St., Columbus, Ohio. $5.00.

Review of literature on thermal, structural, electrical, magnetic and other physical properties. (Ti)

152-V. (Book.) German. **(Hard Materials and Hard Metals) Hartstoffe und Hartmetalle.** R. Kieffer and P. Schwarzkopf. 717 p. 1953. Springer-Verlag, Vienna 1, Austria. $19.00.

Preparation and properties of all refractory compounds which can be used in hard metal. Theoretical treatment of atomic structure and survey of literature on preparation and properties of refractory carbides, nitrides, borides, and silicides. Production, properties and application of commercially important cemented carbides. (American edition abstracted as Item 34-V, 1953.) (EG-d, SG-h)

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POSITIONS OPEN

East

METALLURGIST: With aptitude for research and development in field of high alloy steels. Prefer man with laboratory experience, possessing sound background in physical metallurgy and capable of writing clear, concise reports. Opportunities for professional development through publicatons and association with recognized authorities. In reply indicate training, experience, military status and salary requirements. Box 6-5

INSTRUCTOR or ASSISTANT PROFESSOR: To teach physical metallurgy, starting September, in engineering school, New York City. Opportunity for consulting or study for advanced degree. Send resume with educational and experience background. Box 6-10.

METAL FINISHING TECHNICIAN: With special experience in all phases of aluminum finishing, bright dipping, anodizing, dyeing, sealing, etc. Opportunity for young man who could start on salary from $5000 to $7500, depending on experience and training. In reply give experience, training, family status, when available. Replies confidential. Box 6-15.

MANUFACTURER'S REPRESENTATIVES: Wanted to handle new, complete line of industrial electric furnaces for heat treating, so stable many are used for instrumentation and calibration. Over 40 standard models, manufactured by well-rated concern in Philadelphia area. Write giving resume of capabilities, background and area covered. (Other territories also available). L and L Manufacturing Co., Dept. D., Chester, Pa.

INSPECTION ENGINEER: For major oil company with extensive Middle East operations. Graduate engineer with minimum five years experience maintaining and inspecting pressure vessels and oil handling equipment, or five years experience in structural inspection, diversified construction work and field engineering. Must have thorough knowledge of API and ASME codes for fired and unfired pressure vessels and pressure piping. Box 6-80.

INSPECTION METHOD ANALYST: To develop inspection methods and promote maximum thoroughness and efficiency for major oil company with extensive Middle East operations. Graduate engineer or metallurgist with ten years experience in design or inspection of petroleum producing and refining equipment. Five years of this experience must be in inspection work entailing all-around knowledge of the plant equipment found in petroleum producing and refining. Box 6-85.

Midwest

CHIEF METALLURGIST: Machine tool company specializing in cutting tools requires chief metallurgist with experience on high speed steel. Please send complete resume and salary requirements. Box 6-20.

WROUGHT PRODUCTS ENGINEER: To work on processing problems and set up procedures for extrusion, rolling and forging of copper-base alloys. Metallurgical engineering training desirable but experience may be substituted for formal education. Minimum of two years experience required. In reply state age, education, experience and salary expected. Box 6-25.

METALLURGIST: For research and development. Prefer man with experience in steel fabrication, stainless and heat resistant alloys with some experience with titanium. Duties would include supervision of metallographic and physical testing laboratory and participation in product development. Salary open. Box 6-30.

METALLURGIST: To take charge of plant metallurgical department. Prefer man with experience in steel fabrication, stainless and heat resistant alloys and some experience with titanium. Duties would include supervision of metallographic and physical testing laboratory and participation in forge plant trouble shooting and quality control. Salary open. Box 6-35.

SALESMAN: Manufacturer of nickel alloys requires assistant for office and sales work, traveling in Cleveland vicinity. Technical education desirable but not essential. When writing, state age, experience, availability and salary, and attach a small recent photograph. Box 6-40.

INSTRUCTOR or PROFESSOR: Of physical metallurgy, for undergraduate and graduate teaching and research. Rank and salary dependent on qualifications. Write: Department of Metallurgical Engineering, Illinois Institute of Technology, Technology Center, Chicago 16, Ill.

HEAT TREATER: With 10 to 15 years practical experience in heat treating many types of alloys. Must be familiar with jigs and fixtures used for heat treating. Work of technical and supervisory nature with company manufacturing aircraft assemblies of steels and high-temperature alloys. Box 6-50.

(Continued on p. 69)

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EMPLOYMENT SERVICE BUREAU

(*Continued from p. 67*)

METALLURGISTS: For alloy development. Work includes composition development for high-temperature and magnetic alloys, phase diagrams, creep, precipitation hardening, vacuum melting and other techniques. Development experience in physical metallurgy or alloy systems required, background in theoretical physical metallurgy and knowledge of solid state physics useful. M.S. or Ph.D. in metallurgical engineering. For application write to: Westinghouse Electric Corp., Educational Dept., East Pittsburgh, Pa.

METALLURGIST: For melting and casting operation using induction furnaces. B.S. degree in metallurgical engineering required plus two years experience, preferably of supervisory nature. Applicant should be under 35 and be willing to swing morning and night shifts. Send resume of education, experience and salary requirements. Box 6-55.

LIBRARIAN: Woman, recent graduate in engineering or metallurgy, for reference work and literature searching in industrial library. Growing need for such literature specialists. Large company with broad interests. Box 6-90.

West

METALLURGISTS: Several positions available in near future at government research laboratory in Southern California. Knowledge and experience in fields of welding and joining, ferrous and nonferrous founding materials, heat treatment or physical metallurgy is essential. Knowledge of ordnance materials desirable but not essential. Box 6-60.

South

METALLURGIST: Opportunity in new electrical apparatus plant. Work along lines of development and application metallurgy. Write giving full details of education and experience. Box 6-65.

Foreign

CORROSION ENGINEER: Graduate chemical or metallurgical engineer with minimum ten years experience analyzing and resolving corrosion problems. Five years of this experience should be in corrosion work relating to petroleum producing and refinery materials and equipment. Box 6-70.

POSITIONS WANTED

METALLURGIST: Seventeen years experience in ferrous heat treating processes. Adaptable, mechanically inclined, skilled in application of flame and induction hardening, including design and construction of inductors and fixtures. Knowledge of machining and related problems, toolsteels, application and specification. Married, age 47, available July. Box 6-95.

METALLURGIST: M. S. Degree, age 29, family. Seven years diversified experience in research and manufacturing. Ferrous and nonferrous research including X-ray diffraction, electron microscopy, spectroscopy, physical testing, heat treatment and foundry procedures. Chief engineer for foundry producing corrosion resistant alloys. Experienced in dealing with customer technical personnel. Box 6-100.

METALLURGICAL EXECUTIVE, DIRECTOR OF TECHNICAL PROCESSES: Graduate metallurgical engineer, professional license, age 33, desires position utilizing managerial background, laboratory control, plating, welding, corrosion, machinability, heat treatment, including induction and flame hardening, and ferrous and nonferrous. Specifications and inspection systems. Minimum salary $10,000. Box 6-105.

ADMINISTRATIVE ASSISTANT: To president or as an industrial research administrator. Age 38, married, children, B.S. in chemistry and metallurgy. Now director of metallurgy and research. Fifteen years of research and production experience in applications of chemistry, chemical engineering and metallurgy to the engineering field. Desires to locate in Midwest, preferably Ohio. Box 6-110.

METALLURGIST: Desires position in cast iron research and development. Fifteen year background in cast iron, including industrial, teaching and research experience. No location preference. Box 6-115.

PROFESSOR OF PHYSICAL METALLURGY: Desires change. Eleven years teaching graduate and undergraduate physical metallurgy courses. Available for fall semester. No location preference. Willing to discuss rank and salary, references on request. Box 6-120.

METALLURGIST: Age 30, Ph.D. degree in 1954, major in metallurgy, minor in physical chemistry. Desires research or development position in industry or a teaching position, or combined teaching and research in university. Two years experience in precision casting, vacuum melting and casting at large research laboratory, 9 months in small gray

iron foundry, 5 years teaching. Currently instructor and graduate student at large Eastern university. Location immaterial. Box 6-125.

PROFESSOR: Ph.D. degree in physical metallurgy, presently employed in research. Teaching experience. Interested in teaching career at university. Part-time research preferred. Box 6-130.

PHYSICAL METALLURGIST: Ph.D. degree in metallurgy, age 30, married, two children. Experience includes 3 years in Army, 2½ years industrial research. Courses include advanced physical metallurgy, X-ray diffraction, diffusion, powder metallurgy and extractive. Desires academic position. Box 6-135.

METALLURGICAL ENGINEER: B.S., M.S. degrees. Three years experience in laboratory and industrial vacuum melting and alloy development. Experience includes equipment construction and design, establishment of laboratory, planning and supervising development programs, technical reports, supervision of personnel. Age 30, married, children. Prefers development or production position with advancement opportunities in Northeast. Box 6-140.

METALLURGIST: B.S. degree in metallurgy, age 32, married, family. Four years diversified experience in welding research and development. Desires similar position with progressive organization. No location preference. Box 6-145.

METALLURGIST: Looking for opportunities in Michigan. Has broad background in physical metallurgy and engineering including research administration, Ph.D. degree and 11 years in aircraft and steel industries and in academic institution. Especially interested in supervisory or administrative position with industry dealing with modern, unusual metals. Box 6-150.

RESEARCH DIRECTOR or CHIEF MATERIALS ENGINEER: Twenty-five years experience. Full knowledge of engineering design, development and production problems in medium-weight machines and ordnance. Presently head of research laboratory supervising chemists, physicists, metallurgists and materials engineers. Wants administration position of responsibility. Box 6-155.

METALLURGIST-PHYSICIST: M.S. in physics from Case Institute of Technology. Experience includes 2½ years nonferrous research. Languages. Age 30, married, two children. Desires work as metallurgist in research, development or production control. Box 6-160.

METALLURGICAL ENGINEER: B.S., M.S. degrees, age 27, family. Three years as plant and development metallurgist, experienced in steel, high-temperature stainless and titanium alloy forging, heat treating, testing, etc. Background and ability for position with increased responsibility in production or development. Box 6-165.

CHEMICAL ENGINEER: Graduate of National University of Engineering of Greece, graduate courses in metallurgy and metallography at American universities for two years, including laboratory and research work, wants permanent position in Canada as soon as possible. Box 6-170.

METALLURGIST: B.S., M.S. degrees in metallurgical engineering. Age 25, married, two children. Two years in research and development work in nonferrous field with emphasis on alloy development. Six months in process control. Desires position in applied research or development, in Midwest or Southeast. Box 6-175.

METALLURGICAL EXECUTIVE: B.S. in metallurgy, 16 years experience in sales and production of copper-base and other alloy sheet, rod and wire. Now assistant works manager of medium-sized plant. Desires position in sales or production of nonferrous alloys, especially aluminum. Box 6-180.

METALLURGIST: Twelve years diversified experience on supervisory level dealing with all types of materials in aircraft, automotive, industrial research, powder metallurgy, farm implement and casting industries. Would like responsible position with reliable organization in Midwest. Salary open. Brochure on request. Box 6-185.

METALLURGIST: Ph.D., age 34. Desires employment in research laboratory which is actively pursuing problems concerning the flow and fracture of metals. Presently employed in university as director of several government-financed projects. Would consider university academic position if opening were attractive. Box 6-190.

METALLURGICAL ENGINEER: B.S. degree, age 30, married. Extensive experience in technical aspects of heat treating and plating of small parts. Other experience includes metallographic techniques, supervision of laboratory activities, report writing and project-type investigations and development work. Desires responsible position in production phase of physical or electrometallurgy. Box 6-195.

MATERIALS ENGINEER: Desires opportunity in product or process development. Experienced in selection and testing of materials. Strong metallurgical background in copper and aluminum alloys. Nondestructive testing specialist. B.A. degree in chemistry, 1940. Age 38, married. Prefers New England, New York or Pennsylvania. Box 6-210.

METALLURGICAL ENGINEER: B.S. degree, age 33, married. Five years diversified experience in steel mill process control, extensive toolsteel work relating to heat treating, application, trouble shooting and vendor contact. Physical testing and metallography of all types of steel. Desires position as technical service representative or development work. Location immaterial. Box 6-215.

Invitation to Entrants

9th Metallographic Exhibit

Entries are invited in the 9th Metallographic Exhibit, to be held at the National Metal Exposition in Chicago the week of Nov. 1 through 5, 1954. Entries will be displayed to good advantage and awards will be given for the best micrographs as decided by a committee of judges.

Classifications of Micros

1. Toolsteels and tool materials
2. Stainless steels and heat resisting alloys
3. Other steels and irons, cast or wrought
4. Aluminum, magnesium, beryllium, titanium and their alloys
5. Copper, nickel, zinc, lead and their alloys
6. Metals and alloys not otherwise classified
7. Series showing transitions or changes during processing
8. Welds and other joining methods
9. Surface phenomena
10. Results by unconventional techniques (other than electron micrographs)
11. Slags, inclusions, refractories, cermets

Awards and Other Information

A committee of judges will be appointed by the Metal Congress management which will award a First Prize (a medal and blue ribbon) to the best in each classification. Honorable Mentions will also be awarded (with appropriate medals) to other photographs which, in the opinion of the judges, closely approach the winner in excellence. A Grand Prize, in the form of an engrossed certificate and a money award of $100, will also be awarded the exhibitor whose work is adjudged best in the show, and his exhibit shall become the property of the American Society for Metals for preservation and display in the Society's National headquarters in Cleveland.

All photographs may be retained by the Society for one year and placed in a traveling exhibit to the various Chapters. They will be returned to the owners in May 1955 if so desired.

Rules for Entrants

Work which has appeared in previous metallographic exhibits held by the American Society for Metals is unacceptable. Photographic prints shall be mounted on stiff cardboard; maximum dimensions should be limited to 15 by 22 in. Heavy, solid frames are not permissible because of difficulties in mounting the exhibit. Entries should carry a label on the face of the mount giving:

Classification of entry
Material, etchant, magnification
Any special information as desired

The name, company affiliation and postal address of the exhibitor should be placed on the BACK of the mount.

Transparencies or other items to be viewed by transmitted light must be mounted on light-tight boxes wired for plugging into lighting circuit, and built so they can be fixed to the wall.

Entrants living outside the U.S.A. should send their micrographs by first-class letter mail endorsed "Photo for Exhibition—May be opened for customs inspection." To be acceptable as first-class mail the package should measure no more than 35 x 45 cm. (14 x 18 in.)

Exhibits must be delivered before Oct. 15, 1954, either by prepaid express, registered parcel post or first-class letter mail, addressed to:

National Metal Exposition
International Amphitheater
43rd and Halsted Sts.
Chicago 9, Ill.

36th National Metal Congress and Exposition

Chicago, Ill. **November 1 to 5, 1954**